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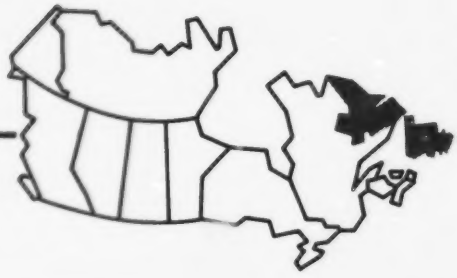
Wood defect and density studies

III Sawlog volume tables for Newfoundland

G. R. Warren and J. P. Meades



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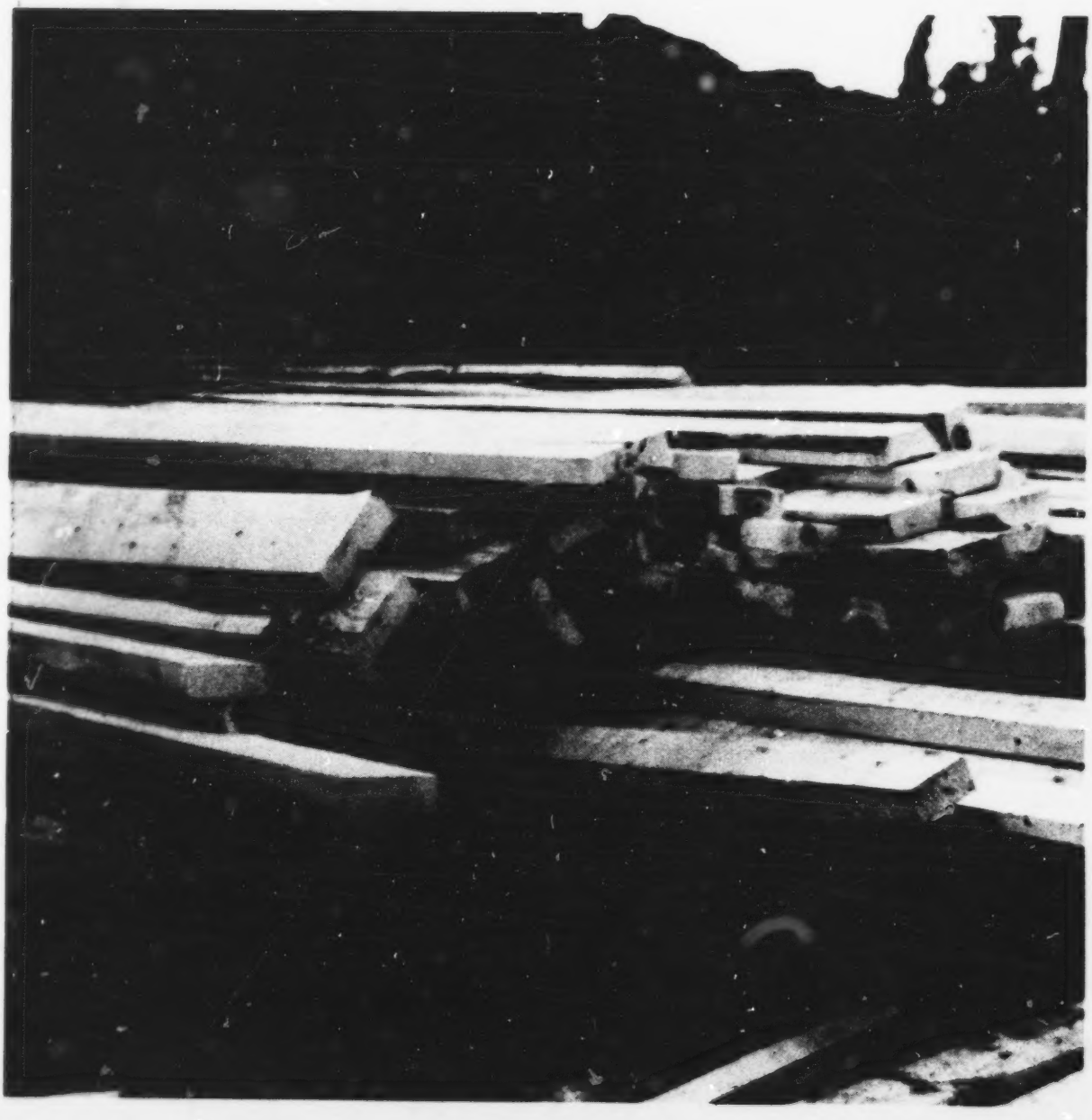

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WOOD DEFECT AND DENSITY STUDIES OF LIVING TREES
III. SAWLOG VOLUME TABLES FOR NEWFOUNDLAND

by G.R. Warrren and J.P. Meades

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ABSTRACT

This report presents the coefficients used to produce sawlog volume tables for four regions on the island of Newfoundland. Using the data from the Newfoundland Defect and Density Study, computer programs were developed to simulate the cutting of sawlogs. A total of 1,133 trees greater than 15 cm dbh distributed over four regions of the Island were analyzed for sawlog volumes. The coefficients required to produce single tree volumes for both metric and board foot measure were computed. These tables should provide a more accurate method of converting inventory roundwood volume estimates to potential sawlog output.

RÉSUMÉ

Sont présentés les coefficients pour la production de tarifs de cubage des grumes de sciage pour quatre régions de l'île de Terre-Neuve. À partir des données recueillies au cours de l'étude des défauts et de la masse volumique effectuée à Terre-Neuve, des programmes informatiques ont été rédigés pour simuler la coupe des grumes de sciage. Au total, 1 133 arbres de dhp supérieur à 15 cm répartis dans quatre régions de l'île ont été analysés quant aux volumes des grumes de sciage. Les coefficients permettant d'établir les volumes pour un arbre en unités métriques et en pieds-planche ont été calculés. Les tarifs produits devraient fournir un moyen plus exact de déterminer la production potentielle de grumes de sciage à partir des estimations des volumes de bois ronds des inventaires.

ACKNOWLEDGEMENTS

The authors of this report would like to express appreciation to Gail Eagen of the Computing and Applied Science Directorate who prepared all the volume programs and did most of the statistical analysis of the data. The data collection would not have been possible without the co-operation of Mr. Monte Osmond of the Newfoundland Forest Service Inventory Section, Mr. George van Dusen of Corner Brook Pulp and Paper Ltd. and Mr. Fred Rowsell of Abitibi-Price Ltd. The efforts of John Marshall and Austin Fudge in crew training and sample analysis are acknowledged.

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WOOD DEFECT AND DENSITY STUDIES OF LIVING TREES

III. SAWLOG VOLUME TABLES FOR NEWFOUNDLAND

by

G.R. Warren and J.P. Meades

INTRODUCTION

Forest inventory results have been traditionally reported in merchantable cubic measure with deductions for defects according to pulpwood harvesting standards. While this method gives reasonable estimates for pulpwood yields, it cannot provide a meaningful measure of the sawtimber potential in a specific area. To estimate the sawlog volume of an area accurately, a board foot sawlog volume table, constructed to suit local specifications is needed.

This study was initiated at the request of the Forest Products Development Section of the Newfoundland Forest Resources and Lands Department. Trees cut down and measured for the Newfoundland Management Unit Cull Study were used in the analysis. A computer program was prepared to simulate as closely as possible the actual cutting of sawlogs in the forest according to the specifications in the Newfoundland Scalers Manual. Sawlog and residual volumes were computed for all sample trees of sawlog size and local volume tables were prepared for the major regions of the Province.

METHODS

The Data Base

The data base of the Newfoundland Defect and Density survey was used to provide the individual trees for this sawlog analysis. After examining the stored data it became obvious that there were insufficient trees of sawlog size to do the study for each individual management unit. The management units were then grouped into regions as shown in Fig. 1. The following table shows the grouping of management units into regions:

Region	Species	Management units	No. of sample trees ≥ 15 cm dbh
1	bF	2, 4, 5, 6, 7, 8	103
	bS	2, 4, 5, 6, 7, 8	177
2	bF	9, 10, 11, 12, 13	79
	bS	9, 10, 11, 12, 13	173
3	bF	14, 15, 16	304
	bS	14, 15, 16, 17, 18	72
4	bF	17, 18	125

The detailed methods of data collection for the Defect and Density Survey are found in the Field Guide (Laflamme *et al*. 1977).

Individual Tree Volume Calculations

Each tree was searched in one foot sections from the base up to 12 cm diameter inside bark looking for 16 foot logs. If form defects or cull were found in a section, this section could not be used in a sawlog. The length of the log below the defective section was determined. If it was larger than 8 feet it could be used as a sawlog. Sawlogs are 8, 10,

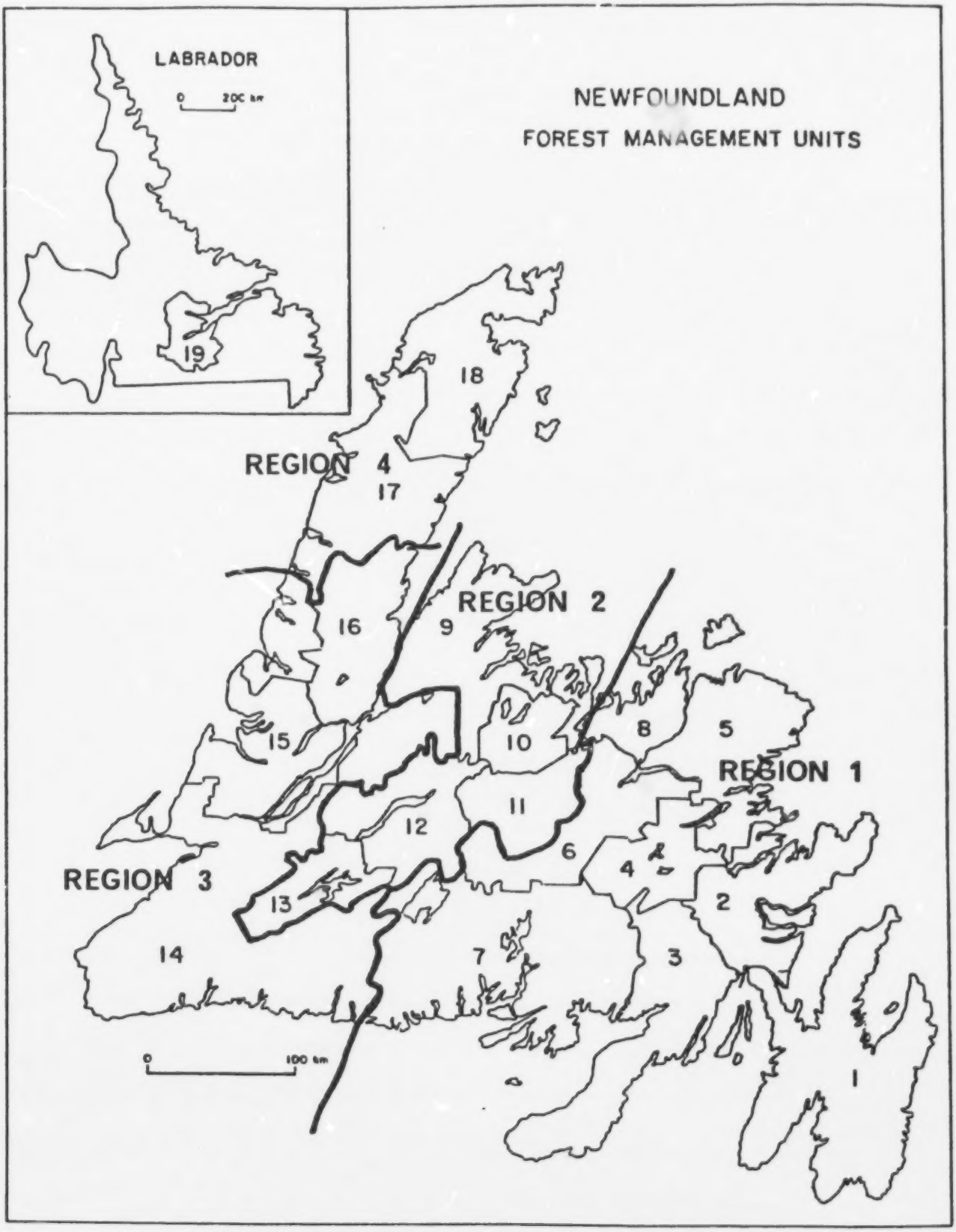

Fig. 1. Major regions of Newfoundland considered for sawlog volume tables and their management units.

12, 14 or 16 feet in length. Any remaining length between the top of the log and the defective one foot section was residual wood. This procedure was repeated until the diameter inside the bark was less than 12 cm. Any length (less than 8 feet) between the last sawlog and the 12 cm top was residual wood. A trim allowance of 6 inches was deducted for each log.

The cubic volume (V) of each log was calculated in cubic measure using Smalian's formula and the diameters at each end of the sawlog and the length of the sawlog:

$$V = \frac{\pi}{144.4.2} (D_1^2 + D_2^2) \cdot L$$

where D_1 = top diameter of sawlog

D_2 = bottom diameter of sawlog

L = length of sawlog

The gross sawlog volume for a tree was the sum of the sawlogs in a tree.

The board foot measure volume (FbM) in a sawlog was calculated using the following formula:

$$FbM = \frac{D \cdot D/2 \cdot L}{12}$$

where D = the top diameter of the log

L = the length of the log

If advanced decay existed within a log (and was less than the cull criteria) the advanced decay cubic volume (Va) was calculated using the following formula:

$$Va = \frac{\pi}{3.144 \cdot 4} D_a^2 \cdot L_a$$

where D_a = the diameter advanced decay

L_a = the length of the decay

The board foot volume of advanced decay (FbM_a) was calculated using the following formula:

$$FbM_a = \frac{D_a^2 \cdot L_a}{15}$$

Volume Table Construction

The sawlog volume tables were developed using methods described by Honer (1967). At first a total cubic metric volume table was prepared for each species for each of the regions designated in the sawlog study. All the data for sample trees of each species in each region were run through a multiple linear regression program and coefficients for the following equation were developed:

$$\frac{D^2}{GTV} = a + b \cdot \left(\frac{1}{H}\right)$$

where D = diameter of breast height (cm)

GTV = the calculated gross total volume of the tree (M^3)

H = the total tree height (M)

a, b = regression coefficients

To estimate the total tree volume when dbh and total height were known the equation was used in the following form:

$$GTV = D^2/\left(a + b\left(\frac{1}{H}\right)\right)$$

To show the range of expected errors in the volume tables an error equation was prepared by running a regression of the residuals from the volume table regression against the actual calculated volumes of the data. The form of the equation is $Y = d + eZ + fZ^2$.

where Y = GTV (obs) - GTV (exp)

Z = GTV (exp)

d, e, f, = regression coefficients

Having this equation, the error volume can be calculated for a tree of any given height and diameter.

The sawlog volume tables were prepared by developing conversion factors for the utilization standards used in scaling sawlogs in Newfoundland. The sawlog specification for the study was 0.15 m stump height and 12 cm inside bark top diameter. These parameters were used to fit the following conversion factor equation:

$$Y = a + bX + cX^2$$

where Y = ratio of sawlog volume to total volume

a, b, c = regression coefficients

$$X = \left(\frac{d}{dbh}\right)^2 \cdot \left(1 + \frac{h}{H}\right) = \left(\frac{12}{dbh}\right)^2 \cdot \left(1 + \frac{.1524}{H}\right)$$

where d = 12 cm = top dib limit for sawlogs

h = .1524 m = stump height (6 inches)

H = total tree height

All sawlog size trees were run through the regression and for each species in each region the following conversion factors were calculated:

a) Ratio of gross sawlog volume in cubic metres to total tree volume in cubic metres.

b) Ratio of net sawlog volume (advanced decay deducted) to total tree volume in cubic metres.

c) Ratio of gross sawlog volume in board foot measure (FbM) to total tree volume in cubic feet.

d) Ratio of net sawlog volume in board foot measure (advanced decay deducted) to total tree volume in cubic feet.

Using the coefficients from the conversion equation sawlog volume tables were prepared from the following formula:

$$SV = GTV \cdot (a + b \cdot x + c \cdot x^2)$$

where SV = sawlog volume

GTV = gross total volume (stump and top included)

By comparing the new board foot table to the gross total volume table in cubic feet a table was generated to show the net board feet per cord (85 cubic feet) output for each species in each region.

RESULTS

Total Tree Volume

The coefficients for the total volume equation and its error equation were computed for black spruce and balsam fir and are shown in Tables 1-4 for each region. The total volume equations were derived from all potential sawlog trees, greater than 15 cm dbh, in the Newfoundland Defect and Density survey data. Total volume tables (m^3) and their respective percentage error tables for each species of each region were constructed and are included in Appendices 1-4 for each respective region. The error equation was used to generate a table of percentage error, between the actual and the estimated, for each value in the total volume table. This error table is useful in evaluating the effect of percent error over the range of values in a volume table.

Table 1. Sawlog Volume Table Statistics For Region 1

Parameter	Species	No. of trees	Volume coefficients a	b	c	R^2	RSS
Total volume (m^3)	bS	671	711.498	17405.3	--	0.59	--
	bF	338	304.677	22978.7	--	0.66	--
Error in total volume (m^3)	bS	671	-0.0025	0.1514	-0.2446	--	--
	bF	338	0.0040	0.1482	0.0390	--	--
Gross sawlog volume (m^3)	bS	177	0.9209	-0.1850	-0.3359	0.97	0.1131
	bF	103	1.0134	-0.9506	0.7777	0.97	0.1411
Net sawlog volume (m^3)	bS	177	0.9170	-0.1798	-0.3364	0.97	0.1173
	bF	103	0.9779	-0.8141	-0.6347	0.96	0.1453
Gross sawlog volume (FbM)	bS	177	5.1780	-3.9824	1.0879	0.97	0.3814
	bF	103	4.049	-4.3638	1.6833	0.96	0.4618
Net sawlog volume (FbM)	bS	177	5.0811	-3.8858	1.1418	0.96	4537.6
	bF	103	3.3588	4.0875	-6.5551	0.95	5682.0

Table 2. Sawlog Volume Table Statistics For Region 2

Parameter	Species	No. of trees	Volume coefficients a	b	c	R^2	RSS
Total volume (m^3)	bS	685	610.033	19843.0	--	0.61	--
	bF	237	554.565	20961.4	--	0.66	--
Error in total volume (m^3)	bS	685	0.0021	0.0421	0.1263	--	--
	bF	237	-0.0003	0.1013	-0.0538	--	--
Gross sawlog volume (m^3)	bS	173	0.7305	0.8003	-1.5332	0.95	0.1561
	bF	79	0.8800	-0.2731	-0.0517	0.96	0.1051
Net sawlog volume (m^3)	bS	173	0.7238	0.8043	-1.5217	0.96	0.1544
	bF	79	0.8836	-0.3387	-0.0596	0.96	0.1080
Gross sawlog volume (FbM)	bS	173	3.8477	2.2493	-5.5820	0.96	4808.5
	bF	79	5.0527	-5.2053	4.6576	0.96	3204.0
Net sawlog volume (FbM)	bS	173	3.4513	3.6397	-6.9046	0.95	5181.8
	bF	79	5.1893	-7.5979	8.7317	0.94	5217.4

Table 3. Sawlog Volume Table Statistics For Region 3

Parameter	Species	No. of trees	Volume coefficients a	b	c	R^2	RSS
Total volume (m^3)	bS	363	330.010	24842.8	—	0.47	—
	bF	769	427.123	22333.7	—	0.53	—
Error in total volume (m^3)	bS	363	0.0002	0.1504	-0.2172	—	—
	bF	769	0.0011	0.0881	0.0000	—	—
Gross sawlog volume (m^3)	bS	72	1.2977	-1.8601	1.2906	0.98	0.0189
	bF	304	1.0526	-0.8401	0.4426	0.98	0.1807
Net sawlog volume (m^3)	bS	72	1.3148	-1.9639	1.4141	0.98	0.0194
	bF	304	1.0533	-0.8602	0.4716	0.98	0.1854
Gross sawlog volume (FbM)	bS	72	6.2316	-10.2393	8.8946	0.97	916.1
	bF	304	4.3847	0.9751	-0.3614	0.97	10316.0
Net sawlog volume (FbM)	bS	72	6.7124	-13.1778	12.4159	0.96	1058.9
	bF	304	4.3884	0.5774	-3.0225	0.97	11794.4

Table 4. Sawlog Volume Table Statistics For Region 4

Parameter	Species	No. of trees	Volume coefficients a	b	c	R^2	RSS
Total volume (m^3)	bF	264	128.086	31747.2	—	0.74	—
Error in total volume (m^3)	bF	264	-0.0003	0.1118	0.0000	—	—
Gross sawlog volume (m^3)	bF	125	1.0045	-0.6945	0.1527	0.99	0.0380
Net sawlog volume (m^3)	bF	125	0.9916	-0.6519	0.1188	0.99	0.0374
Gross sawlog volume (FbM)	bF	125	5.2980	-5.9282	5.5530	0.99	2115.6
Net sawlog volume (FbM)	bF	125	5.0433	-5.3454	5.3694	0.97	2079.4

A large percentage error in small trees may be acceptable whereas a small percentage error in large trees can produce large errors in cruise results. These tables represent the estimated total cubic metre wood volume of trees according to their dbhob (cm) and total height (metres).

Gross Sawlog Volume

Coefficients for the gross sawlog volume equation were computed for black spruce and balsam fir and are shown in Tables 1-4 for each respective region. Gross sawlog volume represents the potential each tree, cut at 0.1524 cm (.5 foot) stump height and 12 cm (4.7 in.) diameter top, has of producing 8, 10, 12, 14 or 16 foot sawlog material without considering deductions for cull or advanced decay. The gross sawlog volume was determined for both the metric (m^3) and standard (FbM) units of measurement. Using these coefficients gross sawlog volume tables were constructed for each species and are included in Appendix 1-4 according to region.

Net Sawlog Volume

The net sawlog volume equation and its coefficients were derived from analysis of the gross sawlog volume data which considered deductions for form defects and decay. Coefficients for this equation for black spruce and balsam fir are presented in Tables 1-4 for each region. Similarly to the gross sawlog volume equations both the metric (m^3) and standard (FbM) units of measurement were determined.

The form defects and decay types which could result in culling of log sections are described in the Wood Defect and Density Field Guide (Laflamme et al. 1977). The net volume equation and coefficients were used to construct the net volume tables included in the Appendices 1-4.

DISCUSSION

The tables in this report represent an attempt to estimate the volume of sawlogs expected from trees of various heights and diameters in Newfoundland forests. As can be seen from the statistics in Tables 1-4. The unexplained variation in the regression models is rather high Tables 1-4), because there was no attempt to stratify the data into any biogeographic areas. Stratification of the data will lead to more accurate estimates for specific areas. Until further results are available these tables provide a reasonable tool for converting inventory volumes of solid wood content into sawlog volumes calculated by the Newfoundland Log Rule. A table "Net Board Feet per Cord" is included for each region in the Appendices. This table shows the number of board feet a cord (85 $ft.^3$) of solid wood will yield at various combinations of diameter and height.

LITERATURE CITED

Honer, T.G. 1967. Standard volume tables and merchantable conversion factors for the commercial tree species of central and eastern Canada. Can. Dept. For. Rural Dev., For. Br., Information Report FMR-X-5.

Laflamme, G., J. Meades and G. Eagen. 1977. Wood defect and density studies of living trees. I-Field Guide. Environ. Can., Can. Forestry Serv., Information Report N-X-148.

APPENDIX I

Total Volume (cubic metres)
Black Spruce
Region 1

DBHOB (cm)	Total Height (metres)							
	6	9	12	15	18	21	24	27
16	0.071	0.097	0.118	0.137	0.153	0.166	0.178	0.189
18		0.122	0.150	0.173	0.193	0.210	0.226	0.239
20		0.151	0.185	0.214	0.238	0.260	0.278	0.295
22		0.183	0.224	0.259	0.288	0.314	0.337	0.357
24		0.218	0.266	0.308	0.343	0.374	0.401	0.425
26			0.313	0.361	0.403	0.439	0.471	0.498
28			0.363	0.419	0.467	0.509	0.546	0.578
30			0.416	0.481	0.536	0.584	0.626	0.664
32			0.474	0.547	0.610	0.665	0.713	0.755
34			0.535	0.618	0.689	0.750	0.805	0.852
36			0.599	0.692	0.772	0.841	0.902	0.956
38				0.771	0.860	0.937	1.005	1.065
40				0.855	0.953	1.039	1.114	1.180
42				0.942	1.051	1.145	1.228	1.301
44				1.034	1.153	1.257	1.348	1.428
46				1.130	1.261	1.374	1.473	1.560
48				1.231	1.373	1.496	1.604	1.699
50				1.336	1.489	1.623	1.740	1.843
52				1.445	1.611	1.755	1.882	1.994
54				1.558	1.737	1.893	2.030	2.150
56				1.675	1.868	2.036	2.183	2.312
58						2.184	2.341	2.481
60						2.337	2.506	2.655
62						2.496	2.676	2.835
64						2.659	2.851	3.020
66							3.032	3.212
68							3.218	3.410
70							3.411	3.613
72							3.608	3.823
74							3.811	4.038

Sample trees larger than 15 cm dbh

a = 711.4980
b = 17405.3000

APPENDIX I

Percent Error in Total Volume
Black Spruce
Region 1

DBHOB (cm)	Total Height (metres)							
	6	9	12	15	18	21	24	27
16	9.9	10.2	10.2	10.0	9.8	9.6	9.4	9.2
18		10.1	9.8	9.5	9.1	8.8	8.5	8.3
20		9.8	9.3	8.8	8.3	7.8	7.4	7.1
22		9.3	8.6	7.9	7.2	6.7	6.2	5.7
24		8.7	7.7	6.8	6.0	5.3	4.7	4.2
26			6.7	5.6	4.7	3.8	3.1	2.5
28			5.6	4.3	3.2	2.2	1.3	0.6
30			4.4	2.9	1.6	0.4	-0.6	-1.5
32			3.0	1.3	-0.2	-1.5	-2.6	-3.7
34			1.6	-0.4	-2.1	-3.5	-4.9	-6.0
36			0.1	-2.2	-4.1	-5.7	-7.2	-8.5
38				-4.1	-6.2	-8.1	-9.7	-11.1
40				-6.1	-8.4	-10.5	-12.3	-13.9
42				-8.2	-10.8	-13.1	-15.1	-16.9
44				-10.4	-13.3	-15.8	-18.0	-20.0
46				-12.7	-15.9	-18.6	-21.1	-23.2
48				-15.2	-18.6	-21.6	-24.2	-26.6
50				-17.7	-21.5	-24.7	-27.6	-30.1
52				-20.4	-24.4	-27.9	-31.0	-33.8
54				-23.1	-27.5	-31.3	-34.6	-37.6
56				-26.0	-30.7	-34.8	-38.4	-41.5
58						-38.4	-42.3	-45.6
60						-42.1	-46.3	-49.9
62						-46.0	-50.4	-54.3
64						-50.0	-54.7	-58.8
66							-59.1	-63.5
68							-63.7	-68.4
70							-68.4	-73.3
72							-73.2	-78.4
74							-78.2	-83.7

Sample trees larger than 15 cm dbh

d = -0.0025
e = 0.1514
f = -0.2446

APPENDIX I

Gross Volume of Sawlogs (cubic metres)
(Stump Height 0.1524 m, Top DIB, 12 cm)
Black Spruce
Region 1

DBHOB (cm)	Total Height (metres)							
	6	9	12	15	18	21	24	27
16	0.050	0.068	0.084	0.097	0.108	0.118	0.126	0.134
18		0.094	0.115	0.133	0.149	0.162	0.174	0.184
20		0.122	0.150	0.173	0.193	0.210	0.225	0.239
22		0.153	0.187	0.216	0.241	0.262	0.281	0.298
24		0.186	0.227	0.262	0.293	0.319	0.342	0.362
26			0.271	0.313	0.349	0.380	0.407	0.432
28			0.317	0.366	0.409	0.445	0.478	0.506
30			0.367	0.424	0.473	0.516	0.553	0.586
32			0.420	0.486	0.542	0.590	0.633	0.671
34			0.477	0.551	0.615	0.670	0.718	0.761
36			0.537	0.620	0.692	0.754	0.808	0.856
38				0.693	0.773	0.843	0.903	0.957
40				0.770	0.859	0.936	1.004	1.063
42				0.851	0.949	1.035	1.109	1.175
44				0.936	1.044	1.138	1.220	1.292
46				1.025	1.143	1.245	1.335	1.415
48				1.117	1.246	1.358	1.456	1.543
50				1.214	1.354	1.475	1.582	1.676
52				1.314	1.466	1.597	1.713	1.814
54				1.419	1.582	1.724	1.849	1.959
56				1.527	1.703	1.856	1.990	2.108
58						1.992	2.136	2.263
60						2.134	2.287	2.423
62						2.280	2.444	2.589
64						2.430	2.606	2.760
66							2.772	2.937
68							2.944	3.119
70							3.121	3.307
72							3.303	3.499
74							3.490	3.698

Sample trees larger than 15 cm dbh

a = 0.9209
b = -0.1850
c = -0.3359

APPENDIX I

Net Volume of Sawlogs (cubic metres)
(Stump Height 0.1524 m, Top DIB, 12 cm)
Black Spruce
Region 1

DBHOB (cm)	Total Height (metres)							
	6	9	12	15	18	21	24	27
16	0.050	0.068	0.084	0.097	0.108	0.118	0.126	0.134
18		0.094	0.115	0.133	0.148	0.162	0.173	0.184
20		0.122	0.149	0.172	0.192	0.210	0.225	0.238
22		0.152	0.186	0.215	0.240	0.262	0.281	0.297
24		0.185	0.226	0.262	0.292	0.318	0.341	0.361
26			0.270	0.312	0.348	0.379	0.406	0.430
28			0.316	0.365	0.407	0.444	0.476	0.504
30			0.366	0.423	0.471	0.514	0.551	0.584
32			0.419	0.484	0.540	0.588	0.631	0.668
34			0.475	0.549	0.612	0.667	0.715	0.758
36			0.535	0.618	0.689	0.751	0.805	0.853
38				0.691	0.770	0.840	0.900	0.954
40				0.768	0.856	0.933	1.000	1.059
42				0.848	0.946	1.031	1.105	1.171
44				0.933	1.040	1.133	1.215	1.287
46				1.021	1.139	1.241	1.330	1.409
48				1.113	1.241	1.353	1.450	1.537
50				1.209	1.349	1.470	1.576	1.669
52				1.309	1.460	1.591	1.706	1.807
54				1.413	1.576	1.718	1.841	1.951
56				1.521	1.696	1.849	1.982	2.100
58						1.984	2.128	2.254
60						2.125	2.278	2.414
62						2.270	2.434	2.579
64						2.421	2.595	2.749
66							2.761	2.925
68							2.932	3.106
70							3.108	3.293
72							3.290	3.485
74							3.476	3.683

Sample trees larger than 15 cm dbh

a = 0.9170
b = -0.1798
c = -0.3364

APPENDIX I

Gross Volume of Sawlogs (board foot measure)
(Stump Height 0.5 ft., Top DIB, 4.7 in.)
Black Spruce
Region 1

DBHOB (cm)	Total Height (metres)							
	6	9	12	15	18	21	24	27
16	8.1	11.1	13.6	15.8	17.6	19.2	20.6	21.8
18		15.6	19.1	22.1	24.6	26.9	28.8	30.5
20		20.7	25.3	29.2	32.6	35.6	38.1	40.4
22		26.3	32.2	37.3	41.6	45.3	48.6	51.5
24		32.6	39.9	46.1	51.4	56.1	60.1	63.7
26			48.3	55.8	62.2	67.8	72.7	77.0
28			57.3	66.2	73.9	80.5	86.4	91.5
30			67.1	77.5	86.5	94.2	101.0	107.0
32			77.5	89.6	99.9	108.9	116.7	123.7
34			88.7	102.4	114.2	124.5	133.5	141.4
36			100.5	116.1	129.5	141.1	151.3	160.3
38				130.5	145.5	158.6	170.1	180.2
40				145.7	162.5	177.1	189.9	201.2
42				161.7	180.4	196.5	210.7	223.3
44				178.5	199.1	216.9	232.6	246.4
46				196.1	218.7	238.3	255.5	270.7
48				214.4	239.1	260.6	279.4	296.0
50				233.6	260.5	283.9	304.4	322.4
52				253.5	282.7	308.1	330.3	349.9
54				274.2	305.8	333.2	357.3	378.5
56				295.7	329.8	359.4	385.3	408.2
58						386.4	414.3	438.9
60						414.4	444.3	470.8
62						443.4	475.4	503.7
64						473.3	507.5	537.6
66							540.6	572.7
68							574.7	608.8
70							609.8	646.1
72							646.0	684.4
74							683.1	723.7

Sample trees larger than 15 cm dbh

a = 5.1780
b = -3.9824
c = 1.0879

APPENDIX I

Net Volume of Sawlogs (board foot measure)
(Stump Height 0.5 ft., Top DIB, 4.7 in.)
Black Spruce
Region 1

DBHOB (cm)	Total Height (metres)							
	6	9	12	15	18	21	24	27
16	8.1	11.0	13.5	15.7	17.5	19.1	20.4	21.7
18		15.4	18.9	21.8	24.3	26.5	28.4	30.1
20		20.4	24.9	28.8	32.2	35.1	37.6	39.8
22		25.9	31.7	36.7	40.9	44.6	47.8	50.7
24		32.0	39.2	45.3	50.6	55.1	59.1	62.6
26			47.4	54.8	61.1	66.6	71.5	75.7
28			56.3	65.1	72.6	79.1	84.8	89.9
30			65.9	76.1	84.9	92.5	99.2	105.1
32			76.1	87.9	98.1	106.9	114.6	121.4
34			87.0	100.5	112.2	122.2	131.0	138.8
36			98.6	113.9	127.1	138.5	148.5	157.3
38				128.1	142.9	155.7	166.9	176.8
40				143.0	159.5	173.8	186.4	197.4
42				158.7	177.0	192.9	206.8	219.1
44				175.2	195.4	212.9	228.3	241.8
46				192.4	214.6	233.8	250.7	265.6
48				210.4	234.7	255.7	274.2	290.5
50				229.2	255.6	278.5	298.6	316.4
52				248.7	277.4	302.3	324.1	343.4
54				269.0	300.0	327.0	350.6	371.4
56				290.1	323.6	352.6	378.0	400.5
58						379.1	406.5	430.7
60						406.6	436.0	461.9
62						435.0	466.4	494.1
64						464.4	497.9	527.5
66							530.3	561.9
68							563.8	597.3
70							598.3	633.8
72							633.7	671.4
74							670.2	710.0

Sample trees larger than 15 cm dbh

a = 5.0811
b = -3.8858
c = 1.1418

APPENDIX I

Net Board Feet Per Cord
Black Spruce
Region 1

DBHOB (cm)	Total Height (metres)							
	6	9	12	15	18	21	24	27
16	273.7	274.7	275.2	275.6	275.8	275.9	276.0	276.1
18		302.4	302.9	303.2	303.4	303.5	303.6	303.7
20		324.0	324.4	324.6	324.8	324.9	325.0	325.0
22		340.9	341.2	341.4	341.5	341.6	341.7	341.8
24		354.2	354.5	354.7	354.8	354.9	354.9	355.0
26			365.2	365.3	365.4	365.5	365.6	365.6
28			373.8	374.0	374.1	374.1	374.2	374.2
30			380.9	381.1	381.1	381.2	381.2	381.3
32			386.8	386.9	387.0	387.1	387.1	387.1
34			391.8	391.9	391.9	392.0	392.0	392.0
36			396.0	396.1	396.1	396.2	396.2	396.2
38				399.6	399.7	399.7	399.7	399.8
40				402.7	402.7	402.8	402.8	402.8
42				405.3	405.4	405.4	405.4	405.4
44				407.6	407.7	407.7	407.7	407.7
46				409.7	409.7	409.7	409.7	409.8
48				411.4	411.5	411.5	411.5	411.5
50				413.0	413.0	413.1	413.1	413.1
52				414.4	414.4	414.5	414.5	414.5
54				415.7	415.7	415.7	415.7	415.7
56				416.8	416.8	416.8	416.8	416.9
58						417.8	417.9	417.9
60						418.8	418.8	418.8
62						419.6	419.6	419.6
64						420.3	420.3	420.3
66							421.0	421.0
68							421.6	421.7
70							422.2	422.2
72							422.7	422.7
74							423.2	423.2

Sample trees larger than 15 cm dbh

APPENDIX I

Total Volume (cubic metres)
Balsam Fir
Region 1

DBHOB (cm)	Total Height (metres)							
	6	9	12	15	18	21	24	27
16	0.062	0.090	0.115	0.139	0.162	0.183	0.203	0.222
18		0.113	0.146	0.176	0.205	0.232	0.257	0.280
20		0.140	0.180	0.218	0.253	0.286	0.317	0.346
22		0.169	0.218	0.264	0.306	0.346	0.383	0.419
24		0.202	0.260	0.314	0.364	0.412	0.456	0.498
26			0.305	0.368	0.428	0.483	0.536	0.585
28			0.353	0.427	0.496	0.560	0.621	0.678
30			0.405	0.490	0.569	0.643	0.713	0.779
32			0.461	0.558	0.648	0.732	0.811	0.886
34			0.521	0.629	0.731	0.826	0.916	1.000
36			0.584	0.706	0.820	0.926	1.027	1.121
38				0.786	0.913	1.032	1.144	1.249
40				0.871	1.012	1.144	1.268	1.384
42				0.960	1.116	1.261	1.398	1.526
44				1.054	1.224	1.384	1.534	1.675
46				1.152	1.338	1.513	1.677	1.831
48				1.254	1.457	1.647	1.825	1.994
50				1.361	1.581	1.787	1.981	2.163
52				1.472	1.710	1.933	2.142	2.340
54				1.588	1.844	2.084	2.310	2.523
56				1.708	1.983	2.242	2.485	2.713
58						2.405	2.665	2.911
60						2.573	2.852	3.115
62						2.748	3.046	3.326
64						2.928	3.245	3.544
66							3.451	3.769
68							3.664	4.001
70							3.882	4.240
72							4.107	4.485
74							4.339	4.738

Sample trees larger than 15 cm dbh

a = 304.6770
b = 22978.7000

APPENDIX I

Percent Error in Total Volume
Balsam Fir
Region 1

DBHOB (cm)	Total Height (metres)							
	6	9	12	15	18	21	24	27
16	21.6	19.7	18.8	18.3	18.0	17.8	17.6	17.5
18		18.8	18.2	17.8	17.6	17.5	17.4	17.4
20		18.3	17.8	17.5	17.4	17.4	17.3	17.3
22		17.9	17.5	17.4	17.3	17.3	17.4	17.4
24		17.6	17.4	17.3	17.4	17.4	17.5	17.6
26			17.3	17.4	17.4	17.6	17.7	17.8
28			17.4	17.4	17.6	17.7	17.9	18.1
30			17.4	17.6	17.8	18.0	18.2	18.4
32			17.5	17.7	18.0	18.2	18.5	18.7
34			17.6	17.9	18.2	18.5	18.8	19.1
36			17.8	18.2	18.5	18.9	19.2	19.6
38				18.4	18.8	19.3	19.7	20.0
40				18.7	19.2	19.7	20.1	20.5
42				19.0	19.5	20.1	20.6	21.1
44				19.3	19.9	20.5	21.1	21.6
46				19.7	20.4	21.0	21.6	22.2
48				20.1	20.8	21.5	22.2	22.8
50				20.4	21.3	22.0	22.8	23.5
52				20.9	21.7	22.6	23.4	24.1
54				21.3	22.3	23.2	24.0	24.8
56				21.7	22.8	23.8	24.7	25.6
58						24.4	25.4	26.3
60						25.0	26.1	27.1
62						25.7	26.9	28.0
64						26.4	27.6	28.8
66							28.4	29.7
68							29.3	30.6
70							30.1	31.5
72							31.0	31.5
74							31.9	33.4

Sample trees larger than 15 cm dbh

d = 0.0040
e = 0.1482
f = 0.0390

APPENDIX I

Gross Volume of Sawlogs (cubic metres)
(Stump Height 0.1524 m, Top DIB, 12 cm)
Balsam Fir
Region 1

DBHOB (cm)	Total Height (metres)							
	6	9	12	15	18	21	24	27
16	0.045	0.065	0.084	0.101	0.117	0.133	0.147	0.160
18		0.084	0.108	0.131	0.152	0.172	0.191	0.209
20		0.108	0.139	0.168	0.195	0.220	0.244	0.267
22		0.135	0.174	0.210	0.244	0.276	0.306	0.334
24		0.166	0.213	0.258	0.300	0.339	0.376	0.410
26			0.257	0.311	0.361	0.408	0.453	0.494
28			0.305	0.369	0.428	0.484	0.537	0.586
30			0.357	0.431	0.501	0.566	0.628	0.686
32			0.412	0.498	0.579	0.655	0.726	0.793
34			0.472	0.570	0.662	0.749	0.830	0.907
36			0.535	0.647	0.751	0.849	0.941	1.028
38				0.728	0.845	0.956	1.059	1.157
40				0.813	0.945	1.068	1.184	1.293
42				0.903	1.049	1.186	1.314	1.436
44				0.998	1.159	1.310	1.452	1.586
46				1.096	1.274	1.440	1.596	1.743
48				1.200	1.394	1.576	1.746	1.907
50				1.308	1.519	1.717	1.903	2.079
52				1.420	1.649	1.865	2.067	2.257
54				1.537	1.785	2.018	2.237	2.442
56				1.658	1.926	2.177	2.413	2.635
58						2.342	2.596	2.835
60						2.512	2.785	3.041
62						2.689	2.981	3.255
64						2.871	3.183	3.476
66							3.391	3.703
68							3.606	3.938
70							3.828	4.180
72							4.056	4.429
74							4.290	4.685

Sample trees larger than 15 cm dbh

a = 1.0134
b = -0.9506
c = 0.7777

APPENDIX I

Net Volume of Sawlogs (cubic metres)
(Stump Height 0.1524 m, Top DIB, 12 cm)
Balsam Fir
Region 1

DBHOB (cm)	Total Height (metres)							
	6	9	12	15	18	21	24	27
16	0.045	0.064	0.083	0.100	0.117	0.132	0.146	0.160
18		0.084	0.108	0.131	0.152	0.172	0.190	0.208
20		0.107	0.138	0.167	0.194	0.219	0.243	0.265
22		0.134	0.172	0.208	0.242	0.274	0.303	0.331
24		0.164	0.211	0.255	0.296	0.335	0.371	0.405
26			0.253	0.306	0.356	0.402	0.446	0.487
28			0.300	0.362	0.421	0.476	0.527	0.576
30			0.350	0.423	0.491	0.555	0.616	0.672
32			0.404	0.488	0.567	0.641	0.710	0.776
34			0.461	0.557	0.648	0.732	0.811	0.886
36			0.522	0.631	0.733	0.829	0.919	1.004
38				0.709	0.824	0.932	1.033	1.128
40				0.792	0.920	1.040	1.153	1.259
42				0.879	1.021	1.154	1.279	1.397
44				0.970	1.127	1.274	1.412	1.542
46				1.066	1.238	1.399	1.551	1.694
48				1.166	1.354	1.530	1.696	1.853
50				1.270	1.475	1.667	1.848	2.018
52				1.378	1.601	1.809	2.006	2.190
54				1.491	1.732	1.957	2.170	2.369
56				1.608	1.867	2.111	2.340	2.555
58						2.270	2.516	2.748
60						2.435	2.699	2.947
62						2.605	2.888	3.154
64						2.781	3.083	3.367
66							3.284	3.587
68							3.492	3.813
70							3.705	4.047
72							3.925	4.287
74							4.152	4.534

Sample trees larger than 15 cm dbh

a = 0.9779
b = -0.8141
c = -0.6347

APPENDIX I

Gross Volume of Sawlogs (board foot measure)
(Stump Height 0.5 ft., Top DIB, 4.7 in.)
Balsam Fir
Region 1

DBHOB (cm)	Total Height (metres)							
	6	9	12	15	18	21	24	27
16	4.6	6.7	8.6	10.4	12.1	13.7	15.2	16.6
18		9.7	12.5	15.1	17.6	19.9	22.1	24.1
20		13.2	17.1	20.7	24.0	27.2	30.1	32.9
22		17.2	22.2	26.9	31.3	35.4	39.2	42.8
24		21.7	28.0	33.8	39.3	44.5	49.3	53.8
26			34.3	41.5	48.2	54.5	60.4	65.9
28			41.1	49.7	57.8	65.3	72.4	79.1
30			48.5	58.6	68.1	77.0	85.4	93.3
32			56.4	68.2	79.2	89.6	99.3	108.5
34			64.9	78.4	91.1	103.0	114.2	124.7
36			73.8	89.2	103.7	117.2	129.9	141.9
38				100.7	117.0	132.3	146.6	160.1
40				112.8	131.1	148.2	164.2	179.4
42				125.6	145.8	164.9	182.8	199.6
44				138.9	161.4	182.4	202.2	220.8
46				152.9	177.6	200.8	222.6	243.1
48				167.5	194.6	220.0	243.8	266.3
50				182.8	212.3	240.0	266.0	290.5
52				198.6	230.7	260.8	289.1	315.7
54				215.1	249.9	282.5	313.1	341.9
56				232.2	269.7	304.9	338.0	369.1
58						328.2	363.8	397.3
60						352.3	390.5	426.5
62						377.3	418.2	456.7
64						403.0	446.7	487.8
66							476.2	520.0
68							506.5	553.2
70							537.8	587.3
72							570.0	622.4
74							603.0	658.6

Sample trees larger than 15 cm dbh

a = 4.0500
b = -4.3638
c = 1.6833

APPENDIX I

Net Volume of Sawlogs (board foot measure)
(Stump Height 0.5 ft., Top DIB, 4.7 in.)
Balsam Fir
Region 1

DBHOB (cm)	Total Height (metres)							
	6	9	12	15	18	21	24	27
16	7.7	11.2	14.5	17.5	20.4	23.1	25.6	28.0
18		15.5	20.0	24.1	28.0	31.7	35.1	38.4
20		19.7	25.3	30.6	35.5	40.2	44.5	48.6
22		23.9	30.8	37.2	43.2	48.8	54.1	59.1
24		28.3	36.4	44.0	51.1	57.8	64.0	69.9
26			42.3	51.1	59.4	67.1	74.4	81.3
28			48.6	58.7	68.1	77.0	85.3	93.2
30			55.1	66.6	77.3	87.4	96.9	105.8
32			62.0	75.0	87.1	98.4	109.0	119.1
34			69.3	83.8	97.3	110.0	121.9	133.1
36			77.0	93.1	108.1	122.2	135.4	147.9
38				102.8	119.4	135.0	149.6	163.4
40				113.1	131.3	148.5	164.5	179.7
42				123.8	143.8	162.6	180.2	196.7
44				135.1	156.9	177.3	196.5	214.6
46				146.8	170.5	192.7	213.6	233.3
48				159.1	184.7	208.8	231.4	252.7
50				171.8	199.6	225.6	250.0	273.0
52				185.1	214.9	243.0	269.3	294.0
54				198.8	230.9	261.0	289.3	315.9
56				213.1	247.5	279.8	310.1	338.6
58						299.2	331.6	362.1
60						319.2	353.8	386.4
62						340.0	376.8	411.5
64						361.4	400.6	437.4
66							425.1	464.2
68							450.3	491.7
70							476.3	520.1
72							503.0	549.3
74							530.5	579.3

Sample trees larger than 15 cm dbh

a = 3.3588
b = 4.0875
c = -6.5551

APPENDIX I

Net Board Feet Per Cord
Balsam Fir
Region 1

DBHOB (cm)	Total Height (metres)							
	6	9	12	15	18	21	24	27
16	300.5	301.9	302.6	303.0	303.3	303.5	303.6	303.7
18		328.7	329.0	329.2	329.3	329.4	329.4	329.5
20		338.0	338.1	338.2	338.2	338.2	338.2	338.3
22		339.6	339.6	339.6	339.6	339.6	339.6	339.6
24		337.8	337.7	337.7	337.7	337.7	337.6	337.6
26			334.5	334.5	334.4	334.4	334.4	334.4
28			330.8	330.8	330.7	330.7	330.7	330.7
30			327.2	327.1	327.1	327.0	327.0	327.0
32			323.7	323.6	323.6	323.5	323.5	323.5
34			320.5	320.4	320.4	320.3	320.3	320.3
36			317.5	317.5	317.4	317.4	317.4	317.4
38				314.8	314.8	314.8	314.8	314.7
40				312.5	312.4	312.4	312.4	312.4
42				310.4	310.3	310.3	310.3	310.3
44				308.5	308.4	308.4	308.4	308.4
46				306.7	306.7	306.7	306.7	306.7
48				305.2	305.2	305.2	305.1	305.1
50				303.8	303.8	303.8	303.8	303.8
52				302.6	302.6	302.5	302.5	302.5
54				301.4	301.4	301.4	301.4	301.4
56				300.4	300.4	300.4	300.4	300.4
58						299.4	299.4	299.4
60						298.6	298.6	298.6
62						297.8	297.8	297.8
64						297.1	297.1	297.1
66							296.4	296.4
68							295.8	295.8
70							295.3	295.3
72							294.8	294.8
74							294.3	294.3

Sample trees larger than 15 cm dbh

APPENDIX II

Total Volume (cubic metres)
Black Spruce
Region 2

DBHOB (cm)	Total Height (metres)							
	6	9	12	15	18	21	24	27
16	0.065	0.091	0.113	0.132	0.149	0.165	0.178	0.190
18		0.115	0.143	0.168	0.189	0.208	0.225	0.241
20		0.142	0.177	0.207	0.234	0.257	0.278	0.297
22		0.172	0.214	0.250	0.283	0.311	0.337	0.360
24		0.205	0.254	0.298	0.336	0.370	0.401	0.428
26			0.299	0.350	0.395	0.435	0.470	0.503
28			0.346	0.406	0.458	0.504	0.546	0.583
30			0.398	0.466	0.526	0.579	0.626	0.669
32			0.452	0.530	0.598	0.659	0.713	0.761
34			0.511	0.598	0.675	0.743	0.805	0.860
36			0.573	0.670	0.757	0.833	0.902	0.964
38				0.747	0.843	0.929	1.005	1.074
40				0.828	0.934	1.029	1.114	1.190
42				0.913	1.030	1.134	1.228	1.312
44				1.002	1.131	1.245	1.347	1.439
46				1.095	1.236	1.361	1.473	1.573
48				1.192	1.345	1.482	1.604	1.713
50				1.293	1.460	1.608	1.740	1.859
52				1.399	1.579	1.739	1.882	2.010
54				1.509	1.703	1.875	2.029	2.168
56				1.622	1.831	2.017	2.183	2.332
58						2.163	2.341	2.501
60						2.315	2.506	2.677
62						2.472	2.675	2.858
64						2.634	2.851	3.045
66							3.032	3.239
68							3.218	3.438
70							3.410	3.643
72							3.608	3.854
74							3.811	4.072

Sample trees larger than 15 cm dbh

a = 610.0335
b = 19843.0000

APPENDIX II

Percent Error In Total Volume
Black Spruce
Region 2

DBHOB (cm)	Total Height (metres)							
	6	9	12	15	18	21	24	27
16	8.2	7.6	7.5	7.4	7.5	7.5	7.6	7.7
18		7.5	7.5	7.6	7.7	7.8	8.0	8.1
20		7.5	7.6	7.8	8.0	8.3	8.5	8.7
22		7.6	7.9	8.2	8.5	8.8	9.1	9.3
24		7.8	8.2	8.7	9.1	9.4	9.8	10.1
26			8.7	9.2	9.7	10.2	10.6	11.0
28			9.2	9.8	10.4	11.0	11.5	11.9
30			9.8	10.5	11.2	11.9	12.5	13.0
32			10.4	11.3	12.1	12.8	13.5	14.1
34			11.1	12.1	13.0	13.9	14.6	15.3
36			11.8	13.0	14.0	15.0	15.8	16.6
38				13.9	15.1	16.2	17.1	18.0
40				14.9	16.2	17.4	18.5	19.4
42				16.0	17.4	18.7	19.9	20.9
44				17.1	18.7	20.1	21.4	22.5
46				18.2	20.0	21.5	23.0	24.2
48				19.4	21.4	23.1	24.6	26.0
50				20.7	22.8	24.6	26.3	27.8
52				22.0	24.3	26.3	28.1	29.7
54				23.4	25.8	28.0	29.9	31.7
56				24.8	27.5	29.8	31.9	33.7
58						31.6	33.9	35.9
60						33.5	35.9	38.1
62						35.5	38.1	40.4
64						37.6	40.3	42.7
66							42.6	45.2
68							44.9	47.7
70							47.3	50.3
72							49.8	52.9
74							52.4	55.7

Sample trees larger than 15 cm dbh

d = 0.0021
e = 0.0421
f = 0.1263

APPENDIX II

Gross Volume of Sawlogs (cubic metres)
(Stump Height 0.1524 m, Top DIB, 12 cm)
Black Spruce
Region 2

DBHOB (cm)	Total Height (metres)							
	6	9	12	15	18	21	24	27
16	0.045	0.062	0.078	0.091	0.103	0.114	0.123	0.132
18		0.090	0.112	0.131	0.148	0.163	0.176	0.188
20		0.116	0.145	0.169	0.191	0.211	0.228	0.244
22		0.143	0.178	0.208	0.235	0.259	0.281	0.300
24		0.171	0.212	0.249	0.281	0.309	0.335	0.358
26			0.248	0.291	0.328	0.362	0.391	0.418
28			0.286	0.335	0.378	0.417	0.451	0.482
30			0.326	0.382	0.431	0.474	0.513	0.548
32			0.368	0.431	0.486	0.535	0.579	0.619
34			0.412	0.483	0.545	0.600	0.649	0.693
36			0.459	0.537	0.606	0.668	0.722	0.772
38				0.594	0.671	0.739	0.799	0.854
40				0.654	0.739	0.813	0.880	0.940
42				0.717	0.810	0.892	0.965	1.031
44				0.783	0.884	0.973	1.053	1.125
46				0.852	0.962	1.059	1.146	1.224
48				0.924	1.043	1.148	1.242	1.327
50				0.998	1.127	1.241	1.343	1.435
52				1.076	1.214	1.337	1.447	1.546
54				1.157	1.305	1.438	1.556	1.662
56				1.240	1.400	1.541	1.668	1.782
58						1.649	1.784	1.906
60						1.760	1.905	2.035
62						1.875	2.029	2.168
64						1.994	2.158	2.305
66							2.290	2.447
68							2.427	2.593
70							2.567	2.743
72							2.712	2.897
74							2.861	3.056

Sample trees larger than 15 cm dbh

a = 0.7305
b = 0.8003
c = -1.5332

APPENDIX II

Net Volume of Sawlogs (cubic metres)
(Stump Height 0.1524 m, Top DIB, 12 cm)
Black Spruce
Region 2

DBHOB (cm)	Total Height (metres)							
	6	9	12	15	18	21	24	27
16	0.045	0.062	0.078	0.091	0.103	0.114	0.123	0.132
18		0.089	0.111	0.130	0.147	0.162	0.176	0.188
20		0.116	0.144	0.169	0.190	0.210	0.227	0.243
22		0.142	0.177	0.207	0.234	0.258	0.279	0.298
24		0.170	0.211	0.247	0.279	0.307	0.333	0.355
26			0.247	0.289	0.326	0.359	0.389	0.415
28			0.284	0.333	0.376	0.414	0.448	0.478
30			0.324	0.379	0.428	0.471	0.510	0.545
32			0.365	0.428	0.483	0.532	0.575	0.615
34			0.409	0.479	0.541	0.595	0.644	0.688
36			0.455	0.533	0.602	0.662	0.717	0.766
38				0.590	0.666	0.733	0.793	0.847
40				0.649	0.733	0.807	0.873	0.933
42				0.712	0.803	0.885	0.957	1.023
44				0.777	0.877	0.966	1.045	1.116
46				0.845	0.954	1.050	1.137	1.214
48				0.916	1.034	1.139	1.232	1.316
50				0.990	1.117	1.231	1.332	1.423
52				1.067	1.204	1.326	1.435	1.533
54				1.147	1.294	1.425	1.543	1.648
56				1.230	1.388	1.528	1.654	1.767
58						1.635	1.769	1.890
60						1.745	1.889	2.017
62						1.859	2.012	2.149
64						1.977	2.139	2.285
66							2.270	2.425
68							2.406	2.570
70							2.545	2.719
72							2.688	2.872
74							2.836	3.029

Sample trees larger than 15 cm dbh

a = 0.7238
b = 0.8043
c = -1.5217

APPENDIX II

Gross Volume of Sawlogs (board foot measure)
(Stump Height 0.5 ft., Top DIB, 4.7 in.)
Black Spruce
Region 2

DBHOB (cm)	Total Height (metres)							
	6	9	12	15	18	21	24	27
16	7.6	10.6	13.3	15.5	17.6	19.4	21.0	22.4
18		15.1	18.9	22.1	25.0	27.5	29.8	31.8
20		19.7	24.5	28.7	32.4	35.7	38.6	41.3
22		24.4	30.3	35.5	40.1	44.2	47.8	51.1
24		29.3	36.5	42.7	48.2	53.1	57.5	61.4
26			43.0	50.3	56.8	62.5	67.7	72.3
28			49.8	58.3	65.9	72.5	78.5	83.8
30			57.1	66.8	75.5	83.1	89.9	96.1
32			64.8	75.9	85.6	94.3	102.0	109.0
34			72.9	85.4	96.4	106.1	114.8	122.7
36			81.5	95.4	107.7	118.6	128.4	137.1
38				106.0	119.6	131.7	142.6	152.3
40				117.1	132.2	145.6	157.5	168.3
42				128.8	145.3	160.0	173.2	185.0
44				141.0	159.1	175.2	189.6	202.6
46				153.7	173.5	191.1	206.8	220.9
48				167.0	188.5	207.6	224.7	240.0
50				180.9	204.1	224.8	243.3	259.9
52				195.3	220.4	242.7	262.7	280.6
54				210.2	237.3	261.3	282.8	302.1
56				225.7	254.8	280.6	303.7	324.4
58						300.6	325.3	347.5
60						321.3	347.7	371.4
62						342.6	370.8	396.1
64						364.7	394.7	421.6
66							419.3	447.9
68							444.7	475.1
70							470.8	503.0
72							497.7	531.7
74							525.4	561.2

Sample trees larger than 15 cm dbh

a = 3.8477
b = 2.2494
c = -5.5820

APPENDIX II

Net Volume of Sawlogs (board foot measure)
(Stump Height 0.5 ft., Top DIB, 4.7 in.)
Black Spruce
Region 2

DBHOB (cm)	Total Height (metres)							
	6	9	12	15	18	21	24	27
16	7.5	10.5	13.1	15.4	17.4	19.2	20.8	22.2
18		15.0	18.7	21.9	24.7	27.2	29.4	31.5
20		19.4	24.1	28.2	31.9	35.1	38.0	40.6
22		23.8	29.6	34.7	39.1	43.1	46.7	49.8
24		28.4	35.3	41.4	46.7	51.4	55.6	59.4
26			41.3	48.4	54.6	60.1	65.0	69.5
28			47.6	55.7	62.9	69.2	74.9	80.0
30			54.2	63.5	71.6	78.9	85.3	91.2
32			61.2	71.6	80.9	89.0	96.3	102.9
34			68.5	80.3	90.6	99.7	107.9	115.3
36			76.3	89.3	100.8	111.0	120.1	128.4
38				98.9	111.6	122.9	133.0	142.1
40				108.9	122.9	135.3	146.5	156.5
42				119.4	134.8	148.4	160.6	171.5
44				130.4	147.1	162.0	175.3	187.3
46				141.8	160.1	176.3	190.8	203.8
48				153.8	173.6	191.2	206.9	221.0
50				166.2	187.6	206.6	223.6	238.9
52				179.2	202.2	222.7	241.0	257.5
54				192.6	217.4	239.4	259.1	276.8
56				206.6	233.1	256.7	277.8	296.8
58						274.7	297.3	317.6
60						293.3	317.4	339.0
62						312.4	338.1	361.2
64						332.2	359.5	384.1
66							381.7	407.7
68							404.4	432.0
70							427.9	457.1
72							452.0	482.9
74							476.8	509.4

Sample trees larger than 15 cm dbh

a = 3.4513
b = 3.6397
c = -6.9046

APPENDIX II

Net Board Feet Per Cord
Black Spruce
Region 2

DBHOB (cm)	Total Height (metres)						
	6	9	12	15	18	21	24	27
16	276.6	278.3	279.1	279.7	280.0	280.2	280.4	280.6
18		313.3	313.7	314.0	314.1	314.2	314.3	314.4
20		328.0	328.1	328.2	328.3	328.4	328.4	328.4
22		333.2	333.3	333.3	333.3	333.4	333.4	333.4
24		334.1	334.1	334.1	334.1	334.0	334.0	334.0
26			332.8	332.8	332.7	332.7	332.7	332.7
28			330.6	330.6	330.5	330.5	330.5	330.5
30			328.1	328.0	328.0	328.0	328.0	327.9
32			325.5	325.5	325.4	325.4	325.4	325.4
34			323.0	323.0	323.0	322.9	322.9	322.9
36			320.7	320.7	320.7	320.6	320.6	320.6
38				318.6	318.5	318.5	318.5	318.5
40				316.6	316.6	316.6	316.6	316.6
42				314.9	314.8	314.8	314.8	314.8
44				313.3	313.3	313.2	313.2	313.2
46				311.9	311.8	311.8	311.8	311.8
48				310.6	310.5	310.5	310.5	310.5
50				309.4	309.3	309.3	309.3	309.3
52				308.3	308.3	308.3	308.3	308.2
54				307.3	307.3	307.3	307.3	307.3
56				306.4	306.4	306.4	306.4	306.4
58						305.6	305.6	305.6
60						304.9	304.9	304.9
62						304.2	304.2	304.2
64						303.6	303.6	303.6
66							303.0	303.0
68							302.5	302.5
70							302.0	302.0
72							301.5	301.5
74							301.1	301.1

Sample trees larger than 15 cm dbh

APPENDIX II

Total Volume (cubic metres)
Balsam Fir
Region 2

DBHOB (cm)	Total Height (metres)							
	6	9	12	15	18	21	24	27
16	0.063	0.089	0.111	0.131	0.149	0.165	0.179	0.192
18		0.112	0.141	0.166	0.188	0.209	0.227	0.243
20		0.139	0.174	0.205	0.233	0.258	0.280	0.301
22		0.168	0.210	0.248	0.282	0.312	0.339	0.364
24		0.200	0.250	0.295	0.335	0.371	0.403	0.433
26			0.294	0.346	0.393	0.435	0.473	0.508
28			0.341	0.402	0.456	0.505	0.549	0.589
30			0.391	0.461	0.524	0.580	0.630	0.676
32			0.445	0.525	0.596	0.659	0.717	0.769
34			0.502	0.592	0.672	0.744	0.810	0.869
36			0.563	0.664	0.754	0.835	0.908	0.974
38				0.740	0.840	0.930	1.011	1.085
40				0.820	0.931	1.030	1.120	1.202
42				0.904	1.026	1.136	1.235	1.325
44				0.992	1.126	1.247	1.356	1.455
46				1.084	1.231	1.363	1.482	1.590
48				1.180	1.340	1.484	1.613	1.731
50				1.281	1.454	1.610	1.751	1.878
52				1.385	1.573	1.741	1.894	2.032
54				1.494	1.696	1.878	2.042	2.191
56				1.607	1.824	2.020	2.196	2.356
58						2.167	2.356	2.528
60						2.319	2.521	2.705
62						2.476	2.692	2.888
64						2.638	2.868	3.078
66							3.051	3.273
68							3.238	3.474
70							3.431	3.682
72							3.630	3.895
74							3.835	4.114

Sample trees larger than 15 cm dbh

a = 554.5653
b = 20961.4000

APPENDIX II

Percent Error in Total Volume
Balsam Fir
Region 2

DBHOB (cm)	Total Height (metres)							
	6	9	12	15	18	21	24	27
16	9.3	9.3	9.2	9.2	9.1	9.0	9.0	8.9
18		9.2	9.1	9.0	8.9	8.9	8.8	8.7
20		9.1	9.0	8.9	8.7	8.6	8.5	8.4
22		9.0	8.8	8.7	8.5	8.4	8.2	8.1
24		8.9	8.7	8.4	8.2	8.0	7.9	7.7
26			8.4	8.2	7.9	7.7	7.5	7.3
28			8.2	7.9	7.6	7.4	7.1	6.9
30			7.9	7.6	7.3	7.0	6.7	6.4
32			7.7	7.2	6.9	6.5	6.2	5.9
34			7.4	6.9	6.5	6.1	5.7	5.4
36			7.0	6.5	6.0	5.6	5.2	4.9
38				6.1	5.6	5.1	4.7	4.3
40				5.7	5.1	4.6	4.1	3.6
42				5.2	4.6	4.0	3.5	3.0
44				4.8	4.0	3.4	2.8	2.3
46				4.3	3.5	2.8	2.1	1.6
48				3.8	2.9	2.1	1.4	0.8
50				3.2	2.3	1.4	0.7	0.0
52				2.7	1.6	0.7	-0.1	-0.8
54				2.1	1.0	0.0	-0.9	-1.7
56				1.5	0.3	-0.8	-1.7	-2.6
58						-1.5	-2.6	-3.5
60						-2.4	-3.4	-4.4
62						-3.2	-4.4	-5.4
64						-4.1	-5.3	-6.4
66							-6.3	-7.5
68							-7.3	-8.6
70							-8.3	-9.7
72							-9.4	-10.8
74							-10.5	-12.0

Sample trees larger than 15 cm dbh

d = -0.0003
e = 0.1013
f = -0.0538

APPENDIX II

Gross Volume of Sawlogs (cubic metres)
(Stump Height 0.1524 m, Top DIB, 12 cm)
Balsam Fir
Region 2

DBHOB (cm)	Total Height (metres)							
	6	9	12	15	18	21	24	27
16	0.045	0.063	0.079	0.093	0.105	0.117	0.127	0.136
18		0.084	0.105	0.124	0.141	0.156	0.170	0.182
20		0.107	0.134	0.159	0.180	0.199	0.217	0.233
22		0.133	0.167	0.197	0.223	0.247	0.269	0.289
24		0.161	0.202	0.238	0.271	0.300	0.326	0.350
26			0.240	0.284	0.322	0.357	0.388	0.416
28			0.282	0.332	0.377	0.418	0.454	0.488
30			0.326	0.385	0.437	0.484	0.526	0.564
32			0.374	0.441	0.500	0.554	0.603	0.647
34			0.424	0.500	0.568	0.629	0.684	0.734
36			0.478	0.563	0.640	0.708	0.770	0.827
38				0.630	0.716	0.792	0.862	0.924
40				0.701	0.796	0.881	0.958	1.028
42				0.775	0.880	0.974	1.059	1.136
44				0.852	0.968	1.071	1.165	1.250
46				0.933	1.060	1.173	1.276	1.369
48				1.018	1.156	1.280	1.392	1.493
50				1.106	1.256	1.391	1.513	1.623
52				1.198	1.361	1.507	1.638	1.758
54				1.294	1.469	1.627	1.769	1.898
56				1.393	1.582	1.752	1.905	2.043
58						1.881	2.045	2.194
60						2.015	2.191	2.350
62						2.153	2.341	2.512
64						2.296	2.496	2.678
66							2.656	2.850
68							2.822	3.027
70							2.992	3.210
72							3.167	3.398
74							3.347	3.591

Sample trees larger than 15 cm dbh

a = 0.8800
b = -0.2731
c = -0.0517

APPENDIX II

Net Volume of Sawlogs (cubic metres)
(Stump Height 0.1524 m, Top DIB, 12 cm)
Balsam Fir
Region 2

DBHOB (cm)	Total Height (metres)							
	6	9	12	15	18	21	24	27
16	0.042	0.060	0.075	0.088	0.100	0.111	0.121	0.129
18		0.081	0.101	0.119	0.136	0.150	0.163	0.175
20		0.104	0.131	0.154	0.175	0.194	0.211	0.226
22		0.130	0.163	0.192	0.219	0.242	0.263	0.283
24		0.159	0.199	0.234	0.266	0.295	0.320	0.344
26			0.237	0.280	0.318	0.352	0.383	0.411
28			0.279	0.329	0.373	0.413	0.450	0.482
30			0.323	0.381	0.433	0.480	0.522	0.560
32			0.371	0.438	0.497	0.550	0.598	0.642
34			0.422	0.497	0.565	0.625	0.680	0.730
36			0.476	0.561	0.637	0.705	0.767	0.823
38				0.628	0.713	0.789	0.858	0.921
40				0.699	0.793	0.878	0.955	1.025
42				0.773	0.878	0.972	1.057	1.134
44				0.851	0.966	1.070	1.163	1.248
46				0.932	1.059	1.172	1.274	1.367
48				1.017	1.155	1.279	1.391	1.492
50				1.106	1.256	1.391	1.512	1.622
52				1.198	1.361	1.507	1.638	1.758
54				1.294	1.470	1.627	1.770	1.899
56				1.394	1.583	1.753	1.906	2.045
58						1.882	2.047	2.196
60						2.017	2.193	2.353
62						2.155	2.344	2.515
64						2.299	2.500	2.682
66							2.661	2.855
68							2.827	3.033
70							2.997	3.216
72							3.173	3.404
74							3.354	3.598

Sample trees larger than 15 cm dbh

a = 0.8836
b = -0.3387
c = -0.0596

APPENDIX II

Gross Volume of Sawlogs (board foot measure)
(Stump Height 0.5 ft., Top DIB, 4.7 in.)
Balsam Fir
Region 2

DBHOB (cm)	Total Height (metres)							
	6	9	12	15	18	21	24	27
16	8.1	11.3	14.2	16.7	19.0	21.0	22.8	24.5
18		14.5	18.2	21.4	24.4	27.0	29.3	31.5
20		18.5	23.2	27.3	31.1	34.4	37.4	40.1
22		23.2	29.0	34.2	38.9	43.1	46.8	50.3
24		28.4	35.7	42.1	47.8	52.9	57.5	61.7
26			43.0	50.7	57.6	63.8	69.4	74.5
28			51.1	60.3	68.4	75.8	82.4	88.4
30			59.8	70.6	80.1	88.7	96.5	103.6
32			69.2	81.7	92.7	102.7	111.7	119.8
34			79.3	93.5	106.2	117.6	127.9	137.2
36			90.0	106.2	120.6	133.5	145.2	155.8
38				119.5	135.8	150.3	163.5	175.4
40				133.7	151.8	168.1	182.8	196.1
42				148.6	168.7	186.8	203.1	218.0
44				164.2	186.5	206.5	224.5	240.9
46				180.6	205.1	227.1	246.9	264.9
48				197.7	224.5	248.6	270.3	290.0
50				215.5	244.8	271.0	294.7	316.2
52				234.1	265.9	294.4	320.1	343.5
54				253.5	287.8	318.7	346.6	371.8
56				273.5	310.6	343.9	374.0	401.3
58						370.1	402.4	431.8
60						397.2	431.9	463.4
62						425.2	462.3	496.0
64						454.1	493.8	529.8
66							526.2	564.6
68							559.7	600.5
70							594.1	637.5
72							629.6	675.5
74							666.1	714.6

Sample trees larger than 15 cm dbh

a = 5.0527
b = -5.2053
c = 4.6576

APPENDIX II

Net Volume of Sawlogs (board foot measure)
(Stump Height 0.5 ft., Top DIB, 4.7 in.)
Balsam Fir
Region 2

DBHOB (cm)	Total Height (metres)							
	6	9	12	15	18	21	24	27
16	8.3	11.6	14.5	17.1	19.4	21.4	23.3	25.0
18		14.0	17.6	20.7	23.5	26.0	28.3	30.4
20		17.5	22.0	25.9	29.4	32.6	35.4	38.0
22		21.9	27.4	32.3	36.7	40.7	44.2	47.5
24		27.0	33.8	39.9	45.3	50.2	54.5	58.5
26			41.0	48.4	55.0	60.9	66.2	71.1
28			49.1	57.9	65.7	72.8	79.2	84.9
30			57.8	68.2	77.5	85.8	93.3	100.1
32			67.3	79.4	90.2	99.9	108.6	116.5
34			77.5	91.4	103.8	115.0	125.0	134.2
36			88.4	104.3	118.4	131.1	142.6	153.0
38				117.9	133.9	148.2	161.2	173.0
40				132.3	150.3	166.4	180.9	194.1
42				147.5	167.5	185.5	201.7	216.4
44				163.5	185.7	205.6	223.6	239.9
46				180.2	204.7	226.6	246.5	264.5
48				197.8	224.6	248.7	270.4	290.2
50				216.0	245.4	271.7	295.4	317.0
52				235.1	267.0	295.6	321.5	344.9
54				254.9	289.5	320.5	348.6	374.0
56				275.5	312.8	346.4	376.7	404.2
58						373.2	405.8	435.4
60						401.0	436.0	467.9
62						429.7	467.3	501.4
64						459.4	499.5	536.0
66							532.8	571.7
68							567.2	608.6
70							602.5	646.5
72							638.9	685.5
74							676.4	725.7

Sample trees larger than 15 cm dbh

a = 5.1893
b = -7.5979
c = 8.7317

APPENDIX II

Net Board Feet Per Cord
Balsam Fir
Region 2

DBHOB (cm)	Total Height (metres)							
	6	9	12	15	18	21	24	27
16	315.0	314.0	313.5	313.3	313.1	312.9	312.8	312.8
18		300.5	300.5	300.4	300.4	300.4	300.4	300.4
20		303.9	304.1	304.2	304.2	304.3	304.3	304.4
22		313.5	313.7	313.9	314.0	314.1	314.1	314.2
24		324.8	325.1	325.2	325.3	325.4	325.5	325.5
26			336.2	336.4	336.5	336.6	336.7	336.7
28			346.6	346.8	346.9	347.0	347.0	347.1
30			355.9	356.1	356.2	356.2	356.3	356.4
32			364.1	364.3	364.4	364.5	364.5	364.6
34			371.4	371.6	371.7	371.7	371.8	371.8
36			377.8	377.9	378.0	378.1	378.1	378.2
38				383.6	383.6	383.7	383.7	383.8
40				388.5	388.6	388.6	388.7	388.7
42				392.9	392.9	393.0	393.0	393.1
44				396.7	396.8	396.9	396.9	396.9
46				400.2	400.3	400.3	400.3	400.4
48				403.3	403.3	403.4	403.4	403.4
50				406.0	406.1	406.1	406.1	406.2
52				408.5	408.5	408.6	408.6	408.6
54				410.7	410.8	410.8	410.8	410.8
56				412.7	412.8	412.8	412.8	412.8
58						414.6	414.6	414.7
60						416.3	416.3	416.3
62						417.8	417.8	417.8
64						419.2	419.2	419.2
66							420.4	420.4
68							421.6	421.6
70							422.6	422.7
72							423.6	423.6
74							424.5	424.5

Sample trees larger than 15 cm dbh

APPENDIX III

Total Volume (cubic metres)
Black Spruce
Region 3

DBHOB (cm)	Total Height (metres)							
	6	9	12	15	18	21	24	27
16	0.057	0.083	0.107	0.129	0.150	0.169	0.188	0.205
18		0.105	0.135	0.163	0.189	0.214	0.237	0.259
20		0.129	0.167	0.201	0.234	0.264	0.293	0.320
22		0.157	0.202	0.244	0.283	0.320	0.355	0.387
24		0.186	0.240	0.290	0.337	0.381	0.422	0.461
26			0.282	0.340	0.395	0.447	0.495	0.541
28			0.327	0.395	0.458	0.518	0.574	0.627
30			0.375	0.453	0.526	0.595	0.659	0.720
32			0.427	0.516	0.599	0.677	0.750	0.819
34			0.482	0.582	0.676	0.764	0.847	0.925
36			0.540	0.653	0.758	0.857	0.949	1.037
38				0.727	0.844	0.954	1.058	1.155
40				0.806	0.936	1.058	1.172	1.280
42				0.888	1.031	1.166	1.292	1.411
44				0.975	1.132	1.280	1.418	1.549
46				1.065	1.237	1.399	1.550	1.693
48				1.160	1.347	1.523	1.688	1.843
50				1.259	1.462	1.652	1.831	2.000
52				1.361	1.581	1.787	1.981	2.163
54				1.468	1.705	1.927	2.136	2.333
56				1.579	1.834	2.073	2.297	2.509
58						2.223	2.464	2.691
60						2.379	2.637	2.880
62						2.541	2.816	3.075
64						2.707	3.000	3.277
66							3.191	3.484
68							3.387	3.699
70							3.589	3.920
72							3.797	4.147
74							4.011	4.380

Sample trees larger than 15 cm dbh

a = 330.0107
b = 24842.8000

APPENDIX III

Percent Error in Total Volume
Black Spruce
Region 3

DBHOB (cm)	Total Height (metres)							
	6	9	12	15	18	21	24	27
16	14.2	13.5	12.9	12.4	11.9	11.5	11.1	10.7
18		13.0	12.3	11.6	11.0	10.5	10.0	9.5
20		12.4	11.5	10.8	10.0	9.4	8.7	8.2
22		11.8	10.8	9.8	9.0	8.2	7.4	6.7
24		11.1	9.9	8.8	7.8	6.8	5.9	5.1
26			9.0	7.7	6.5	5.4	4.3	3.3
28			8.0	6.5	5.1	3.8	2.6	1.4
30			6.9	5.2	3.6	2.2	0.8	- 0.6
32			5.8	3.9	2.1	0.4	- 1.2	- 2.7
34			4.6	2.4	0.4	- 1.5	- 3.3	- 5.0
36			3.3	0.9	- 1.4	- 3.5	- 5.6	- 7.5
38				- 0.7	- 3.3	- 5.7	- 7.9	-10.0
40				- 2.4	- 5.3	- 7.9	-10.4	-12.7
42				- 4.2	- 7.3	-10.3	-13.0	-15.6
44				- 6.1	- 9.5	-12.7	-15.7	-18.6
46				- 8.1	-11.8	-15.3	-18.6	-21.7
48				-10.1	-14.2	-18.0	-21.6	-25.0
50				-12.3	-16.7	-20.8	-24.7	-28.4
52				-14.5	-19.3	-23.8	-28.0	-31.9
54				-16.8	-22.0	-26.8	-31.3	-35.6
56				-19.2	-24.8	-30.0	-34.8	-39.4
58						-33.2	-38.5	-43.4
60						-36.6	-42.2	-47.5
62						-40.1	-46.1	-51.7
64						-43.8	-50.1	-56.1
66							-54.3	-60.6
68							-58.5	-65.3
70							-62.9	-70.1
72							-67.4	-75.0
74							-72.1	-80.1

Sample trees larger than 15 cm dbh

d = 0.0002
e = 0.1504
f = -0.2172

APPENDIX III

Gross Volume of Sawlogs (cubic metres)
(Stump Height 0.1524 m, Top DIB, 12 cm)
Black Spruce
Region 3

DBHOB (cm)	Total Height (metres)							
	6	9	12	15	18	21	24	27
16	0.037	0.054	0.070	0.085	0.098	0.111	0.123	0.135
18		0.076	0.097	0.118	0.137	0.155	0.172	0.188
20		0.102	0.132	0.159	0.185	0.210	0.232	0.254
22		0.134	0.172	0.208	0.242	0.274	0.304	0.332
24		0.169	0.218	0.264	0.307	0.347	0.385	0.420
26			0.269	0.326	0.379	0.428	0.474	0.518
28			0.325	0.394	0.457	0.517	0.573	0.626
30			0.386	0.467	0.543	0.614	0.680	0.743
32			0.452	0.546	0.635	0.717	0.795	0.869
34			0.522	0.631	0.733	0.829	0.919	1.003
36			0.596	0.721	0.838	0.947	1.050	1.147
38				0.817	0.949	1.073	1.189	1.298
40				0.918	1.066	1.205	1.336	1.459
42				1.024	1.190	1.345	1.491	1.628
44				1.136	1.319	1.491	1.653	1.805
46				1.253	1.455	1.645	1.823	1.991
48				1.375	1.597	1.806	2.001	2.186
50				1.503	1.745	1.973	2.187	2.388
52				1.636	1.900	2.148	2.380	2.599
54				1.774	2.060	2.329	2.581	2.819
56				1.917	2.227	2.517	2.790	3.047
58						2.712	3.006	3.283
60						2.914	3.230	3.528
62						3.123	3.462	3.780
64						3.339	3.701	4.042
66							3.948	4.311
68							4.202	4.589
70							4.465	4.875
72							4.734	5.170
74							5.012	5.473

Sample trees larger than 15 cm dbh

a = 1.2977
b = -1.8601
c = 1.2906

APPENDIX III

Net Volume of Sawlogs (cubic metres)
(Stump Height 0.1524 m, Top DIB, 12 cm)
Black Spruce
Region 3

DBHOB (cm)	Total Height (metres)							
	6	9	12	15	18	21	24	27
16	0.037	0.054	0.070	0.084	0.098	0.111	0.123	0.134
18		0.075	0.097	0.117	0.136	0.154	0.171	0.186
20		0.102	0.131	0.159	0.184	0.208	0.231	0.253
22		0.133	0.172	0.208	0.241	0.273	0.303	0.331
24		0.169	0.218	0.264	0.306	0.346	0.384	0.420
26			0.270	0.326	0.379	0.428	0.475	0.519
28			0.326	0.394	0.458	0.518	0.574	0.627
30			0.388	0.469	0.545	0.616	0.683	0.745
32			0.454	0.549	0.638	0.721	0.799	0.873
34			0.525	0.634	0.737	0.833	0.924	1.009
36			0.600	0.726	0.843	0.953	1.057	1.154
38				0.823	0.956	1.080	1.197	1.308
40				0.925	1.074	1.214	1.346	1.470
42				1.032	1.199	1.356	1.503	1.641
44				1.146	1.331	1.504	1.667	1.821
46				1.264	1.468	1.660	1.840	2.009
48				1.388	1.612	1.822	2.020	2.206
50				1.517	1.762	1.992	2.208	2.411
52				1.652	1.919	2.169	2.404	2.625
54				1.792	2.081	2.353	2.608	2.848
56				1.937	2.250	2.543	2.819	3.078
58						2.741	3.038	3.318
60						2.946	3.265	3.565
62						3.157	3.500	3.822
64						3.376	3.742	4.086
66							3.992	4.359
68							4.250	4.641
70							4.515	4.931
72							4.789	5.229
74							5.070	5.536

Sample trees larger than 15 cm dbh

a = 1.3148
b = -1.9639
c = 1.4141

APPENDIX III

Gross Volume of Sawlogs (board foot measure)
(Stump Height 0.5 ft., Top DIB, 4.7 in.)
Black Spruce
Region 3

DBHOB (cm)	Total Height (metres)							
	6	9	12	15	18	21	24	27
16	6.6	9.6	12.4	15.0	17.4	19.6	21.8	23.8
18		12.7	16.3	19.7	22.9	25.9	28.8	31.4
20		16.8	21.7	26.2	30.5	34.4	38.2	41.7
22		21.8	28.2	34.1	39.6	44.8	49.6	54.2
24		27.7	35.7	43.1	50.1	56.7	62.9	68.7
26			44.1	53.4	62.0	70.1	77.7	84.9
28			53.5	64.7	75.1	84.9	94.2	102.8
30			63.6	77.0	89.4	101.1	112.1	122.4
32			74.6	90.2	104.8	118.5	131.4	143.5
34			86.4	104.5	121.4	137.3	152.1	166.2
36			99.0	119.7	139.1	157.2	174.3	190.3
38				135.8	157.8	178.4	197.7	216.0
40				152.9	177.6	200.8	222.6	243.1
42				170.9	198.5	224.4	248.7	271.6
44				189.8	220.4	249.2	276.2	301.6
46				209.5	243.4	275.2	305.0	333.1
48				230.2	267.5	302.3	335.1	366.0
50				251.9	292.5	330.7	366.6	400.3
52				274.4	318.7	360.2	399.3	436.1
54				297.8	345.9	391.0	433.3	473.2
56				322.0	374.1	422.9	468.7	511.8
58						455.9	505.3	551.9
60						490.2	543.3	593.3
62						525.6	582.5	636.2
64						562.2	623.1	680.4
66							664.9	726.1
68							708.1	773.2
70							752.5	821.8
72							798.2	871.7
74							845.3	923.1

Sample trees larger than 15 cm dbh

a = 6.2316
b = -10.2393
c = 8.8946

APPENDIX III

Net Volume of Sawlogs (board foot measure)
(Stump Height 0.5 ft., Top DIB, 4.7 in.)
Black Spruce
Region 3

DBHOB (cm)	Total Height (metres)							
	6	9	12	15	18	21	24	27
16	6.6	9.5	12.2	14.7	17.1	19.3	21.4	23.4
18		12.2	15.7	19.0	22.1	25.0	27.7	30.2
20		16.2	20.9	25.3	29.4	33.3	36.9	40.3
22		21.4	27.6	33.3	38.7	43.8	48.6	53.1
24		27.4	35.4	42.8	49.7	56.2	62.3	68.1
26			44.2	53.5	62.2	70.3	78.0	85.2
28			54.1	65.4	76.1	86.0	95.3	104.1
30			64.9	78.5	91.2	103.2	114.4	124.9
32			76.6	92.7	107.7	121.8	135.0	147.4
34			89.3	107.9	125.4	141.8	157.2	171.7
36			102.7	124.2	144.3	163.1	180.8	197.5
38				141.5	164.4	185.8	206.0	225.0
40				159.8	185.6	209.9	232.6	254.1
42				179.1	208.1	235.2	260.7	284.8
44				199.4	231.6	261.9	290.3	317.0
46				220.7	256.3	289.8	321.2	350.8
48				242.9	282.2	319.0	353.6	386.2
50				266.2	309.2	349.5	387.4	423.1
52				290.4	337.3	381.3	422.6	461.5
54				315.5	366.5	414.3	459.3	501.5
56				341.7	396.9	448.7	497.3	543.1
58						484.3	536.7	586.2
60						521.1	577.6	630.8
62						559.2	619.8	676.9
64						598.6	663.5	724.6
66							708.5	773.8
68							755.0	824.5
70							802.8	876.7
72							852.1	930.5
74							902.7	985.8

Sample trees larger than 15 cm dbh

a = 6.7124
b = -13.1778
c = 12.4159

APPENDIX III

Net Board Feet Per Cord
Black Spruce
Region 3

DBHOB (cm)	Total Height (metres)							
	6	9	12	15	18	21	24	27
16	275.6	275.1	274.9	274.8	274.8	274.7	274.7	274.6
18		279.9	280.2	280.4	280.5	280.6	280.7	280.7
20		301.9	302.5	302.8	303.0	303.2	303.3	303.4
22		328.3	328.9	329.2	329.5	329.7	329.8	329.9
24		354.0	354.6	355.0	355.2	355.4	355.6	355.7
26			378.0	378.4	378.6	378.8	378.9	379.0
28			398.7	399.1	399.3	399.5	399.6	399.7
30			416.8	417.1	417.3	417.4	417.6	417.7
32			432.4	432.7	432.9	433.1	433.2	433.3
34			446.1	446.3	446.5	446.6	446.7	446.8
36			457.9	458.1	458.3	458.4	458.5	458.6
38				468.4	468.6	468.7	468.8	468.8
40				477.4	477.6	477.7	477.8	477.8
42				485.4	485.5	485.6	485.7	485.7
44				492.4	492.5	492.6	492.6	492.7
46				498.5	498.7	498.7	498.8	498.8
48				504.0	504.2	504.2	504.3	504.3
50				509.0	509.1	509.1	509.2	509.2
52				513.4	513.4	513.5	513.6	513.6
54				517.3	517.4	517.5	517.5	517.5
56				520.9	521.0	521.0	521.1	521.1
58						524.2	524.3	524.3
60						527.1	527.2	527.2
62						529.8	529.8	529.9
64						532.2	532.2	532.3
66							534.5	534.5
68							536.5	536.5
70							538.4	538.4
72							540.1	540.1
74							541.7	541.7

Sample trees larger than 15 cm dbh

APPENDIX III

Total Volume (cubic metres)
Balsam Fir
Region 3

DBHOB (cm)	Total Height (metres)							
	6	9	12	15	18	21	24	27
16	0.062	0.088	0.112	0.134	0.153	0.172	0.189	0.204
18		0.111	0.142	0.169	0.194	0.217	0.239	0.258
20		0.138	0.175	0.209	0.240	0.268	0.295	0.319
22		0.166	0.212	0.253	0.290	0.325	0.356	0.386
24		0.198	0.252	0.301	0.345	0.386	0.424	0.459
26			0.295	0.353	0.405	0.453	0.498	0.539
28			0.343	0.409	0.470	0.526	0.577	0.625
30			0.393	0.470	0.540	0.604	0.663	0.718
32			0.448	0.534	0.614	0.687	0.754	0.816
34			0.505	0.603	0.693	0.776	0.851	0.922
36			0.566	0.676	0.777	0.869	0.955	1.033
38				0.754	0.866	0.969	1.064	1.151
40				0.835	0.959	1.073	1.178	1.276
42				0.921	1.058	1.183	1.299	1.406
44				1.010	1.161	1.299	1.426	1.543
46				1.104	1.269	1.420	1.559	1.687
48				1.202	1.381	1.546	1.697	1.837
50				1.305	1.499	1.677	1.841	1.993
52				1.411	1.621	1.814	1.992	2.156
54				1.522	1.748	1.956	2.148	2.325
56				1.637	1.880	2.104	2.310	2.500
58						2.257	2.478	2.682
60						2.415	2.652	2.870
62						2.579	2.831	3.065
64						2.748	3.017	3.266
66							3.208	3.473
68							3.406	3.687
70							3.609	3.907
72							3.818	4.133
74							4.033	4.366

Sample trees larger than 15 cm dbh

a = 427.1233
b = 22333.7000

APPENDIX III

Percent Error in Total Volume
Balsam Fir
Region 3

DBHOB (cm)	Total Height (metres)							
	6	9	12	15	18	21	24	27
16	10.7	10.1	9.8	9.7	9.6	9.5	9.4	9.4
18		9.8	9.6	9.5	9.4	9.3	9.3	9.3
20		9.6	9.5	9.4	9.3	9.2	9.2	9.2
22		9.5	9.4	9.3	9.2	9.2	9.1	9.1
24		9.4	9.3	9.2	9.1	9.1	9.1	9.1
26			9.2	9.1	9.1	9.1	9.0	9.0
28			9.1	9.1	9.1	9.0	9.0	9.0
30			9.1	9.1	9.0	9.0	9.0	9.0
32			9.1	9.0	9.0	9.0	9.0	9.0
34			9.0	9.0	9.0	9.0	8.9	8.9
36			9.0	9.0	9.0	8.9	8.9	8.9
38				9.0	8.9	8.9	8.9	8.9
40				9.0	8.9	8.9	8.9	8.9
42				8.9	8.9	8.9	8.9	8.9
44				8.9	8.9	8.9	8.9	8.9
46				8.9	8.9	8.9	8.9	8.9
48				8.9	8.9	8.9	8.9	8.9
50				8.9	8.9	8.9	8.9	8.9
52				8.9	8.9	8.9	8.9	8.9
54				8.9	8.9	8.9	8.9	8.9
56				8.9	8.9	8.9	8.9	8.9
58						8.9	8.9	8.9
60						8.9	8.9	8.9
62						8.9	8.9	8.9
64						8.9	8.9	8.8
66							8.8	8.8
68							8.8	8.8
70							8.8	8.8
72							8.8	8.8
74							8.8	8.8

Sample trees larger than 15 cm dbh

d = 0.0011
e = 0.0881
f = 0.0000

APPENDIX III

Gross Volume of Sawlogs (cubic metres)
(Stump Height 0.1524 m, Top DIB, 12 cm)
Balsam Fir
Region 3

DBHOB (cm)	Total Height (metres)							
	6	9	12	15	18	21	24	27
16	0.044	0.063	0.080	0.096	0.110	0.123	0.136	0.147
18		0.085	0.108	0.129	0.149	0.166	0.183	0.198
20		0.111	0.141	0.168	0.193	0.216	0.238	0.257
22		0.140	0.178	0.212	0.244	0.273	0.300	0.324
24		0.172	0.219	0.261	0.300	0.336	0.369	0.399
26			0.264	0.315	0.362	0.405	0.445	0.481
28			0.312	0.373	0.429	0.480	0.527	0.570
30			0.365	0.436	0.501	0.561	0.616	0.667
32			0.422	0.504	0.579	0.647	0.711	0.770
34			0.482	0.576	0.661	0.740	0.812	0.880
36			0.546	0.652	0.749	0.838	0.920	0.996
38				0.733	0.842	0.942	1.035	1.120
40				0.818	0.940	1.052	1.155	1.250
42				0.908	1.043	1.167	1.282	1.388
44				1.002	1.152	1.289	1.415	1.532
46				1.101	1.265	1.415	1.554	1.682
48				1.204	1.383	1.548	1.700	1.840
50				1.312	1.507	1.686	1.851	2.004
52				1.424	1.635	1.830	2.009	2.175
54				1.540	1.769	1.980	2.173	2.353
56				1.661	1.908	2.135	2.344	2.537
58						2.296	2.520	2.728
60						2.462	2.703	2.926
62						2.634	2.892	3.131
64						2.812	3.088	3.342
66							3.289	3.560
68							3.497	3.785
70							3.711	4.017
72							3.931	4.255
74							4.157	4.500

Sample trees larger than 15 cm dbh

a = 1.0526
b = -0.8401
c = 0.4426

APPENDIX III

Net Volume of Sawlogs (cubic metres)
(Stump Height 0.1524 m, Top DIB, 12 cm)
Balsam Fir
Region 3

DBHOB (cm)	Total Height (metres)							
	6	9	12	15	18	21	24	27
16	0.044	0.063	0.080	0.096	0.110	0.123	0.135	0.146
18		0.085	0.108	0.129	0.148	0.166	0.182	0.197
20		0.110	0.140	0.168	0.193	0.216	0.237	0.256
22		0.139	0.177	0.212	0.243	0.272	0.299	0.323
24		0.171	0.218	0.260	0.299	0.335	0.368	0.398
26			0.263	0.314	0.361	0.404	0.443	0.480
28			0.312	0.372	0.428	0.479	0.526	0.569
30			0.364	0.435	0.500	0.560	0.615	0.665
32			0.421	0.503	0.578	0.646	0.710	0.768
34			0.481	0.575	0.660	0.739	0.811	0.878
36			0.545	0.651	0.748	0.837	0.919	0.995
38				0.732	0.841	0.941	1.034	1.119
40				0.818	0.939	1.051	1.154	1.249
42				0.907	1.043	1.167	1.281	1.387
44				1.002	1.151	1.288	1.414	1.531
46				1.100	1.264	1.415	1.553	1.681
48				1.204	1.383	1.547	1.699	1.839
50				1.311	1.506	1.686	1.851	2.003
52				1.423	1.635	1.830	2.009	2.174
54				1.540	1.769	1.979	2.173	2.352
56				1.660	1.908	2.135	2.344	2.537
58						2.295	2.520	2.728
60						2.462	2.703	2.926
62						2.634	2.892	3.131
64						2.812	3.088	3.342
66							3.289	3.561
68							3.497	3.786
70							3.711	4.017
72							3.932	4.256
74							4.158	4.501

Sample trees larger than 15 cm dbh

a = 1.0533
b = -0.8602
c = 0.4716

APPENDIX III

Gross Volume of Sawlogs (board foot measure)
(Stump Height 0.5 ft., Top DIB, 4.7 in.)
Balsam Fir
Region 3

DBHOB (cm)	Total Height (metres)							
	6	9	12	15	18	21	24	27
16	10.5	15.0	19.1	22.8	26.1	29.2	32.1	34.7
18		18.7	23.8	28.4	32.6	36.5	40.0	43.3
20		22.8	29.0	34.6	39.7	44.5	48.8	52.8
22		27.3	34.7	41.4	47.6	53.3	58.5	63.3
24		32.2	41.0	48.9	56.2	62.9	69.0	74.7
26			47.8	57.0	65.5	73.3	80.5	87.1
28			55.1	65.8	75.6	84.6	92.8	100.5
30			63.0	75.2	86.4	96.6	106.1	114.8
32			71.4	85.2	97.9	109.5	120.3	130.2
34			80.3	95.9	110.2	123.3	135.3	146.5
36			89.8	107.2	123.2	137.8	151.3	163.8
38				119.2	136.9	153.2	168.2	182.1
40				131.8	151.4	169.4	186.0	201.4
42				145.1	166.7	186.5	204.7	221.6
44				159.0	182.7	204.4	224.4	242.9
46				173.6	199.4	223.1	244.9	265.1
48				188.8	216.8	242.6	266.4	288.3
50				204.6	235.0	263.0	288.7	312.5
52				221.1	254.0	284.2	312.0	337.7
54				238.2	273.7	306.2	336.2	363.9
56				256.0	294.1	329.1	361.3	391.1
58						352.7	387.3	419.2
60						377.3	414.2	448.3
62						402.6	442.0	478.5
64						428.8	470.8	509.6
66							500.4	541.7
68							531.0	574.8
70							562.5	608.8
72							594.9	643.9
74							628.2	680.0

Sample trees larger than 15 cm dbh

a = 4.3847
b = 0.9751
c = -0.3614

APPENDIX III

Net Volume of Sawlogs (board foot measure)
(Stump Height 0.5 ft., Top DIB, 4.7 in.)
Balsam Fir
Region 3

DBHOB (cm)	Total Height (metres)							
	6	9	12	15	18	21	24	27
16	8.1	11.6	14.8	17.6	20.3	22.7	24.9	27.0
18		15.9	20.2	24.1	27.7	31.0	34.1	36.9
20		20.4	25.9	31.0	35.6	39.8	43.7	47.3
22		25.2	32.0	38.3	44.0	49.2	54.0	58.5
24		30.4	38.6	46.1	53.0	59.3	65.1	70.4
26			45.6	54.5	62.6	70.0	76.9	83.2
28			53.1	63.5	72.9	81.6	89.6	96.9
30			61.2	73.0	83.9	93.9	103.1	111.6
32			69.7	83.2	95.6	107.0	117.5	127.1
34			78.7	94.0	108.0	120.9	132.7	143.6
36			88.3	105.5	121.2	135.6	148.8	161.1
38				117.5	135.0	151.1	165.9	179.5
40				130.2	149.6	167.4	183.8	198.9
42				143.6	164.9	184.5	202.6	219.3
44				157.5	181.0	202.5	222.3	240.6
46				172.1	197.8	221.3	242.9	263.0
48				187.4	215.3	240.9	264.5	286.3
50				203.3	233.5	261.3	286.9	310.5
52				219.8	252.5	282.6	310.2	335.8
54				237.0	272.3	304.6	334.5	362.0
56				254.8	292.7	327.5	359.6	389.3
58						351.3	385.7	417.5
60						375.8	412.6	446.7
62						401.2	440.5	476.8
64						427.5	469.3	508.0
66							499.0	540.2
68							529.6	573.3
70							561.2	607.4
72							593.6	642.5
74							626.9	678.6

Sample trees larger than 15 cm dbh

a = 4.3884
b = 0.5774
c = -3.0225

APPENDIX III

Net Board Feet Per Cord
Balsam Fir
Region 3

DBHOB (cm)	Total Height (metres)							
	6	9	12	15	18	21	24	27
16	315.9	317.0	317.6	318.0	318.2	318.4	318.5	318.6
18		342.7	343.1	343.3	343.4	343.5	343.6	343.6
20		356.6	356.8	356.9	357.0	357.0	357.1	357.1
22		364.3	364.5	364.6	364.6	364.7	364.7	364.7
24		368.9	369.0	369.0	369.1	369.1	369.1	369.1
26			371.6	371.7	371.7	371.7	371.7	371.7
28			373.3	373.3	373.3	373.3	373.3	373.3
30			374.2	374.2	374.2	374.3	374.3	374.3
32			374.8	374.8	374.8	374.8	374.8	374.8
34			375.1	375.1	375.1	375.1	375.1	375.1
36			375.3	375.3	375.3	375.3	375.3	375.3
38				375.4	375.4	375.4	375.4	375.4
40				375.4	375.4	375.4	375.4	375.4
42				375.3	375.3	375.3	375.3	375.3
44				375.3	375.3	375.3	375.3	375.3
46				375.2	375.2	375.2	375.2	375.2
48				375.1	375.1	375.1	375.1	375.1
50				375.0	375.0	375.0	375.0	375.0
52				374.9	374.9	374.9	374.9	374.9
54				374.8	374.8	374.8	374.8	374.8
56				374.7	374.7	374.7	374.7	374.7
58						374.7	374.7	374.7
60						374.6	374.6	374.6
62						374.5	374.5	374.5
64						374.4	374.4	374.4
66							374.4	374.4
68							374.3	374.3
70							374.2	374.2
72							374.2	374.2
74							374.1	374.1

Sample trees larger than 15 cm dbh

APPENDIX IV

Total Volume (cubic metres)
Balsam Fir
Region 4

DBHOB (cm)	Total Height (metres)							
	6	9	12	15	18	21	24	27
16	0.047	0.070	0.092	0.114	0.135	0.156	0.176	0.196
18		0.089	0.117	0.144	0.171	0.198	0.223	0.248
20		0.109	0.144	0.178	0.211	0.244	0.276	0.307
22		0.132	0.174	0.216	0.256	0.295	0.334	0.371
24		0.158	0.208	0.257	0.304	0.351	0.397	0.442
26			0.244	0.301	0.357	0.412	0.466	0.518
28			0.283	0.349	0.414	0.478	0.540	0.601
30			0.324	0.401	0.476	0.549	0.620	0.690
32			0.369	0.456	0.541	0.624	0.706	0.785
34			0.417	0.515	0.611	0.705	0.797	0.887
36			0.467	0.577	0.685	0.790	0.893	0.994
38				0.643	0.763	0.881	0.995	1.107
40				0.713	0.846	0.976	1.103	1.227
42				0.786	0.932	1.076	1.216	1.353
44				0.863	1.023	1.181	1.334	1.485
46				0.943	1.119	1.290	1.458	1.623
48				1.026	1.218	1.405	1.588	1.767
50				1.114	1.321	1.525	1.723	1.917
52				1.205	1.429	1.649	1.864	2.074
54				1.299	1.541	1.778	2.010	2.236
56				1.397	1.658	1.912	2.161	2.405
58						2.051	2.319	2.580
60						2.195	2.481	2.761
62						2.344	2.649	2.948
64						2.498	2.823	3.141
66							3.002	3.341
68							3.187	3.546
70							3.377	3.758
72							3.573	3.976
74							3.774	4.200

Sample trees larger than 15 cm dbh

a = 128.0860
b = 31747.2000

APPENDIX IV

Percent Error in Total Volume
Balsam Fir
Region 4

DBHOB (cm)	Total Height (metres)							
	6	9	12	15	18	21	24	27
16	10.6	10.8	10.9	10.9	11.0	11.0	11.0	11.0
18		10.9	10.9	11.0	11.0	11.0	11.1	11.1
20		10.9	11.0	11.0	11.0	11.1	11.1	11.1
22		11.0	11.0	11.1	11.1	11.1	11.1	11.1
24		11.0	11.0	11.1	11.1	11.1	11.1	11.1
26			11.1	11.1	11.1	11.1	11.1	11.1
28			11.1	11.1	11.1	11.1	11.1	11.1
30			11.1	11.1	11.1	11.1	11.1	11.1
32			11.1	11.1	11.1	11.1	11.1	11.1
34			11.1	11.1	11.1	11.1	11.1	11.1
36			11.1	11.1	11.1	11.1	11.1	11.2
38				11.1	11.1	11.1	11.2	11.2
40				11.1	11.1	11.2	11.2	11.2
42				11.1	11.2	11.2	11.2	11.2
44				11.1	11.2	11.2	11.2	11.2
46				11.2	11.2	11.2	11.2	11.2
48				11.2	11.2	11.2	11.2	11.2
50				11.2	11.2	11.2	11.2	11.2
52				11.2	11.2	11.2	11.2	11.2
54				11.2	11.2	11.2	11.2	11.2
56				11.2	11.2	11.2	11.2	11.2
58						11.2	11.2	11.2
60						11.2	11.2	11.2
62						11.2	11.2	11.2
64						11.2	11.2	11.2
66							11.2	11.2
68							11.2	11.2
70							11.2	11.2
72							11.2	11.2
74							11.2	11.2

Sample trees larger than 15 cm dbh

d = -0.0003
e = 0.1118
f = 0.0000

APPENDIX IV

Gross Volume of Sawlogs (cubic metres)
(Stump Height 0.1524 m, Top DIB, 12 cm)
Balsam Fir
Region 4

DBHOB (cm)	Total Height (metres)							
	6	9	12	15	18	21	24	27
16	0.031	0.046	0.061	0.075	0.089	0.103	0.117	0.130
18		0.064	0.084	0.104	0.124	0.143	0.162	0.180
20		0.084	0.111	0.138	0.163	0.188	0.213	0.237
22		0.107	0.141	0.175	0.207	0.239	0.270	0.301
24		0.132	0.174	0.215	0.255	0.295	0.333	0.371
26			0.210	0.260	0.308	0.356	0.402	0.447
28			0.249	0.308	0.365	0.421	0.476	0.530
30			0.291	0.359	0.426	0.492	0.556	0.619
32			0.335	0.415	0.492	0.568	0.642	0.714
34			0.383	0.474	0.562	0.648	0.733	0.816
36			0.434	0.536	0.636	0.734	0.830	0.923
38				0.602	0.715	0.824	0.932	1.037
40				0.672	0.797	0.920	1.040	1.157
42				0.745	0.884	1.020	1.153	1.283
44				0.822	0.976	1.125	1.272	1.416
46				0.093	1.071	1.236	1.397	1.554
48				0.987	1.171	1.351	1.527	1.699
50				1.074	1.275	1.471	1.662	1.850
52				1.166	1.383	1.596	1.804	2.007
54				1.260	1.496	1.725	1.950	2.170
56				1.359	1.612	1.860	2.103	2.340
58						2.000	2.260	2.515
60						2.144	2.424	2.697
62						2.294	2.593	2.885
64						2.448	2.767	3.079
66							2.947	3.279
68							3.132	3.486
70							3.324	3.698
72							3.520	3.917
74							3.722	4.142

Sample trees larger than 15 cm dbh

a = 1.0045
b = -0.6945
c = 0.1527

APPENDIX IV

Net Volume of Sawlogs (cubic metres)
(Stump Height 0.1524 m, Top DIB, 12 cm)
Balsam Fir
Region 4

DBHOB (cm)	Total Height (metres)							
	6	9	12	15	18	21	24	27
16	0.031	0.046	0.061	0.075	0.089	0.103	0.117	0.130
18		0.064	0.084	0.104	0.124	0.143	0.162	0.180
20		0.084	0.111	0.137	0.163	0.188	0.213	0.237
22		0.107	0.141	0.174	0.206	0.238	0.269	0.300
24		0.131	0.173	0.214	0.254	0.293	0.332	0.369
26			0.209	0.258	0.306	0.353	0.399	0.445
28			0.247	0.306	0.363	0.418	0.473	0.526
30			0.288	0.357	0.423	0.488	0.552	0.614
32			0.333	0.411	0.488	0.563	0.636	0.708
34			0.380	0.469	0.557	0.643	0.726	0.808
36			0.430	0.531	0.630	0.727	0.822	0.915
38				0.596	0.708	0.817	0.923	1.027
40				0.665	0.789	0.911	1.030	1.146
42				0.738	0.875	1.010	1.141	1.270
44				0.814	0.965	1.114	1.259	1.401
46				0.893	1.060	1.223	1.382	1.538
48				0.976	1.158	1.336	1.510	1.681
50				1.063	1.261	1.455	1.644	1.830
52				1.153	1.368	1.578	1.784	1.985
54				1.246	1.479	1.706	1.928	2.146
56				1.344	1.594	1.839	2.079	2.313
58						1.977	2.235	2.486
60						2.120	2.396	2.666
62						2.267	2.563	2.851
64						2.420	2.735	3.043
66							2.912	3.241
68							3.096	3.445
70							3.284	3.654
72							3.478	3.870
74							3.678	4.092

Sample trees larger than 15 cm dbh

a = 0.9916
b = -0.6519
c = 0.1188

APPENDIX IV

Gross Volume of Sawlogs (board foot measure)
(Stump Height 0.5 ft., Top DIB, 4.7 in.)
Balsam Fir
Region 4

DBHOB (cm)	Total Height (metres)							
	6	9	12	15	18	21	24	27
16	6.2	9.2	12.1	15.0	17.8	20.5	23.2	25.8
18		11.7	15.5	19.1	22.7	26.2	29.6	33.0
20		15.0	19.7	24.4	29.0	33.4	37.8	42.0
22		18.8	24.7	30.6	36.3	41.9	47.4	52.7
24		23.1	30.5	37.7	44.7	51.6	58.3	64.9
26			36.8	45.5	54.0	62.3	70.5	78.4
28			43.8	54.1	64.3	74.1	83.8	93.3
30			51.4	63.5	75.4	87.0	98.3	109.4
32			59.5	73.6	87.3	100.8	113.9	126.8
34			68.3	84.4	100.1	115.6	130.6	145.4
36			77.6	95.9	113.8	131.3	148.4	165.1
38				108.1	128.3	148.0	167.3	186.1
40				121.0	143.5	165.6	187.2	208.3
42				134.5	159.6	184.2	208.2	231.7
44				148.8	176.5	203.7	230.2	256.2
46				163.7	194.2	224.1	253.3	281.9
48				179.3	212.7	245.4	277.4	308.7
50				195.6	232.0	267.7	302.6	336.7
52				212.5	252.2	290.9	328.8	365.9
54				230.1	273.1	315.0	356.1	396.2
56				248.4	294.8	340.1	384.4	427.7
58						366.0	413.7	460.4
60						392.9	444.1	494.2
62						420.7	475.5	529.1
64						449.4	508.0	565.3
66							541.5	602.5
68							576.0	640.9
70							611.5	680.5
72							648.1	721.2
74							685.8	763.1

Sample trees larger than 15 cm dbh

a = 5.2980
b = -5.9282
c = 5.5530

APPENDIX IV

Net Volume of Sawlogs (board foot measure)
(Stump Height 0.5 ft., Top DIB, 4.7 in.)
Balsam Fir
Region 4

DBHOB (cm)	Total Height (metres)							
	6	9	12	15	18	21	24	27
16	6.2	9.3	12.2	15.1	17.9	20.6	23.3	25.9
18		11.7	15.4	19.0	22.5	26.0	29.4	32.7
20		14.7	19.4	24.0	28.5	32.8	37.1	41.3
22		18.3	24.2	29.9	35.4	40.9	46.2	51.4
24		22.4	29.6	36.6	43.4	50.1	56.6	63.0
26			35.6	44.1	52.3	60.3	68.2	75.9
28			42.3	52.3	62.0	71.6	80.9	90.0
30			49.5	61.2	72.6	83.8	94.7	105.4
32			57.2	70.8	84.0	96.9	109.5	121.9
34			65.6	81.0	96.2	111.0	125.4	139.6
36			74.4	92.0	109.2	125.9	142.4	158.4
38				103.6	122.9	141.8	160.3	178.4
40				115.8	137.5	158.6	179.3	199.5
42				128.8	152.8	176.3	199.2	221.7
44				142.3	168.9	194.8	220.2	245.1
46				156.5	185.7	214.3	242.2	269.5
48				171.4	203.3	234.6	265.2	295.1
50				186.9	221.7	255.8	289.1	321.7
52				203.0	240.9	277.9	314.1	349.5
54				219.8	260.8	300.8	340.0	378.4
56				237.2	281.4	324.7	367.0	408.4
58						349.4	394.9	439.4
60						375.0	423.8	471.6
62						401.4	453.7	504.9
64						428.8	484.6	539.3
66							516.5	574.7
68							549.4	611.3
70							583.2	649.0
72							618.0	687.7
74							653.9	727.6

Sample trees larger than 15 cm dbh

a = 5.0433
b = -5.3454
c = 5.3694

APPENDIX IV

Net Board Feet Per Cord
Balsam Fir
Region 4

DBHOB (cm)	Total Height (metres)							
	6	9	12	15	18	21	24	27
16	318.5	318.1	318.0	317.9	317.8	317.8	317.7	317.7
18		316.6	316.6	316.7	316.7	316.7	316.8	316.8
20		323.5	323.7	323.8	323.9	323.9	324.0	324.0
22		333.0	333.2	333.4	333.4	333.5	333.6	333.6
24		342.7	342.9	343.0	343.1	343.2	343.3	343.3
26			351.9	352.0	352.1	352.2	352.3	352.3
28			360.0	360.1	360.2	360.2	360.3	360.3
30			367.0	367.2	367.3	367.3	367.4	367.4
32			373.2	373.3	373.4	373.5	373.5	373.6
34			378.6	378.7	378.8	378.9	378.9	378.9
36			383.3	383.4	383.5	383.5	383.6	383.6
38				387.5	387.6	387.6	387.7	387.7
40				391.1	391.2	391.2	391.3	391.3
42				394.3	394.4	394.4	394.4	394.5
44				397.1	397.2	397.2	397.2	397.2
46				399.6	399.6	399.7	399.7	399.7
48				401.8	401.9	401.9	401.9	401.9
50				403.8	403.8	403.9	403.9	403.9
52				405.6	405.6	405.6	405.6	405.7
54				407.2	407.2	407.2	407.2	407.2
56				408.6	408.6	408.6	408.7	408.7
58						409.9	410.0	410.0
60						411.1	411.1	411.1
62						412.2	412.2	412.2
64						413.2	413.2	413.2
66							414.1	414.1
68							414.9	414.9
70							415.6	415.7
72							416.3	416.3
74							417.0	417.0

Sample trees larger than 15 cm dbh